160408

Vol. I.

TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1923

No. 120

THOMSON SPOT WELDER COMPANY, PETITIONER,

vs.

FORD MOTOR COMPANY.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT.

PETITION FOR CERTIORARI FILED SEPTEMBER 12, 1922.

CERTIORARI AND RETURN FILED DECEMBER 13, 1922.

(29,139)

(29,139)

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1922.

No. 589.

THOMSON SPOT WELDER COMPANY, PETITIONER,

vs.

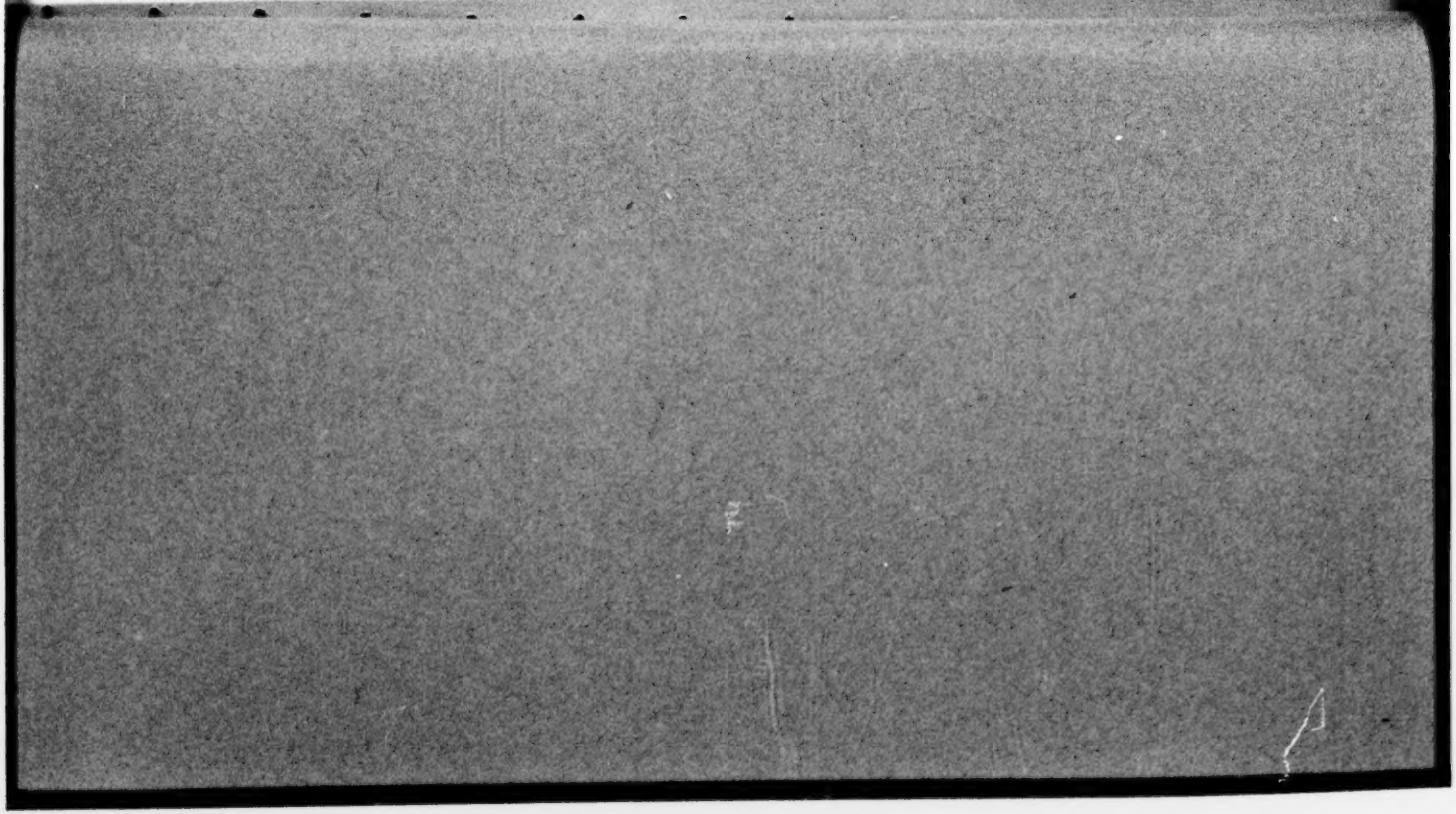
FORD MOTOR COMPANY.

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INDEX.

	Original.	Print.
Record from U. S. district court for the eastern district of Michigan	1	1
Bill of complaint	1	1
Exhibits—Record *in re* Thomson Electric Welding Company *vs.* Barney & Berry, Inc.	7	4
Opinion, Putnam, J., October 5, 1915	7	4
Opinion, *per curiam*, June 14, 1916	13	8
Opinion, Dodge, J., July 11, 1916	14	9
Interlocutory decree, Dodge, July 17, 1916	19	13
Clerk's certificate	21	14
Writ of injunction	22	14
Amended answer of Ford Motor Co	24	15
Plaintiff's interrogatories	30	20
Plaintiff's Exhibit 1—Photograph of Winfield machine	33	22
Answers to interrogatories	34	22
Stipulation as to copies of patents	36	23
Stipulation as to interrogatories	37	24
Stipulation as to answer	37	24

JUDD & DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., FEBRUARY 23, 1923



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INDEX.

	Original.	Print.
Record from U. S. district court for the eastern district of Michigan	1	1
Bill of complaint	1	1
Exhibits—Record *in re* Thomson Electric Welding Company *vs.* Barr & Berry, Inc.	7	4
Opinion, Putnam, J., October 5, 1915	7	4
Opinion, *per curiam*, June 14, 1916	13	8
Opinion, Dodge, J., July 11, 1916	14	9
Interlocutory decree, Dodge, July 17, 1916	19	13
Clerk's certificate	21	14
Writ of injunction	22	14
Amended answer of Ford Motor Co.	24	15
Plaintiff's interrogatories	30	20
Plaintiff's Exhibit 1—Photograph of Winfield machine	33	22
Answers to interrogatories	34	22
Stipulation as to copies of patents	36	23
Stipulation as to interrogatories	37	24
Stipulation as to answer	37	24

JUDD & DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., FEBRUARY 23, 1923.

	Original.	Print.
Memorandum opinion, Killits, J	38	24
Decree dismissing bill	74	50
Petition for appeal	75	51
Assignments of error	76	51
Order allowing appeal	77	52
Petition as to transcript on appeal	77	52
Statement of counsel as to record on appeal	78	52
Opinion on application not to put record in narrative form, Killits, J	79	53
Order that record be not reduced to narrative form	80	53
Stipulation as to filing printed records	81	54
Præcipe for transcript	82	54
Amended præcipe	83	55
Orders enlarging time	84	55
Stipulation *in re* filing printed records	86	56
Statement of evidence	87	57
Testimony of James H. Gravell	88	59
George W. Knapp	147	118
William A. Herring	159	130
George A. Cutter	162	133
James H. Gravel (recalled)	166	137
Plaintiff's Exhibit No. 13—Chart showing comparison of Harmatta's patent No. 1,046,066 with the previous art	216	187
Testimony of Walter Brandt	239	211
Henry C. Townsend	241	213
Charles F. Tischner	242	214
George W. Knapp (recalled)	245	217
William A. Herring	257	229
George W. Knapp, Jr	258	230
Charles H. Schwing	262	234
Charles J. Timms	267	239
Wm. B. Heron	272	244
Sol Richman	275	247
Robert W. Clark	280	252
Hermann Lemp	292	264
James H. Gravell (recalled)	294	266
L. Curtis Brewer	297	269
C. R. Brewer	312	284
Clifton V. Edwards	316	288
Thomas Howe	327	299
Wilbur F. Turner	334	306
Charles G. Wolfe	337	309
Louis L. Little	339	311
George I. Spade	341	313
James H. Gravell (recalled)	346	318
Frank C. Wagner	357	329
James H. Gravell (recalled)	380	352
Thomas Howe (recalled)	405	377
James H. Gravell (recalled)	410	381
Richard L. Binder	415	384

	Original.	Print.
Plaintiff's Exhibit No. 5—Harmatta patent No. 1,046,066	420	387
Plaintiff's Exhibit No. 19—De Ferranti patent No. 906,400	426	392
Plaintiff's Exhibit No. 1—Photograph of Winfield machine	438	400
Plaintiff's Exhibit No. 6—Title paper of Harmatta patent in suit between Thomson Electric Welding Co. and Universal Electric Welding Co.	440	401
Exhibit 1 to Exhibit 6—Memorandum of agreement between Thomson Electric Welding Co. and Universal Electric Welding Co., July 20, 1909	440	401
Exhibit A to Exhibit 6—Memorandum of agreement between Thomson Electric Welding Co. and Universal Electric Welding Co., February 26, 1909	442	403
Exhibit B to Exhibit 6—Blank contract form	449	410
Plaintiff's Exhibit No. 12—Plaintiff's translation of German patent No. 50,909 to Bernados	462	423
Plaintiff's Exhibit No. 13—Chart showing comparison of Harmatta's patent No. 1,046,066 with the previous art	466	427
Plaintiff's Exhibit No. 15—Contract between Eisenhutte Silesia Aktien-Gesellschaft and Thomson Electric Welding Co., April 3, 1912	468	429
Plaintiff's Exhibit No. 16—Contract between Eisenhutte Silesia Aktien-Gesellschaft and National Enameling & Stamping Co., December 3, 1904	472	433
Plaintiff's Exhibit No. 28—Affidavit of Fred P. McBerty in D. C. U. S. for district of Massachusetts in case of Thomson Electric Welding Co. *vs.* Barney & Berry, Inc	476	437
Plaintiff's Exhibit No. 29—Affidavit of John S. Gilder in same case	487	448
Plaintiff's Exhibit No. 30—Affidavit of Evrah C. Lipps in same case	489	450
Agreement between Warren Electric & Specialty Co. and E. C. Lipps, March 2, 1898	497	458
Plaintiff's Exhibit No. 31—Brewer sketch of work bench	500	461
Plaintiff's Exhibit No. 32—Brewer sketch of welding machine	502	462
Plaintiff's Exhibit No. 33—Affidavits in U. S. D. C. for the district of Massachusetts in the case of Thomson Electric Welding Co. *vs.* Barney & Berry, Inc	504	463
Affidavit of Milton W. Bechtel	504	463
Austin C. Pendleton	504	463
Oscar C. Pilz	505	464
Robert J. Meenely	506	465
John S. Gilder	507	466
Walter T. Wakefield	509	468

	Original.	Print.
Affidavit of David R. Estabrook	510	469
Robert W. Bean	511	470
Newton A. Wolcott	512	471
Edward Bettiker	513	472
Alfred Ulp	515	474
Charles B. McCurdy	516	475
Rolland F. Pfile	517	476
Alton J. Lewis	517	476
Frank G. Brown	519	478
Plaintiff's Exhibit No. 34—Photograph of electric fan	526	485
Plaintiff's Exhibit No. 37—Photograph of electric fan	528	486
Amended answer of Ford Motor Co	1	487
Stipulation as to exhibits, etc	6	492
Statement of evidence (continued)	7	493
Testimony of William E. Smith	7	493
Elihu Thomson	41	527
Frank L. Dyer	60	546
Charles F. Tischner	128	614
Affidavits of Adolph F. Rietzel in U. S. Patent Office	130	616
Testimony of Henry C. Townsend	134	620
Testimony of Adolph F. Rietzel	147	633
Affidavits of Adolph F. Rietzel	156	642
Stipulations as to exhibits and depositions	175	661
Testimony of John B. Estabrook	180	666
Exhibit—Transcript from book entitled "Record of the Peerless Electric Co."	182	668
Testimony of Pearl M. Long	193	679
George B. Sawyer	195	681
Charles B. McCurdy	200	686
Fred W. Roberts	205	691
Howard A. Coombs	216	702
Offers in evidence	218	704
Testimony of William Freiss	221	707
F. P. McBerty	225	711
Otto F. Barthel	273	759
F. P. McBerty (recalled)	276	762
Edward B. Craft	287	773
F. P. McBerty (recalled)	315	801
John W. Farley	320	806
F. P. McBerty (recalled)	331	817
Offers in evidence	359	845
Testimony of F. P. McBerty (recalled)	362	848
Jasper W. Powers	387	873
John A. McDonald	392	878
F. P. McBerty (recalled)	399	885
Albertas C. Taylor	406	892
John S. Gilder	416	902
—— McElray	422	908
Fred G. Carter	427	913
Evrah C. Lipps	430	916

	Original.	Print.
Testimony of Francis S. Maguire	439	925
Correspondence	443	929
Testimony of William B. Ensor	468	954
John A. Estabrook (recalled)	472	958
F. P. McBerty (recalled)	474	960
William E. Smith	488	974
Mrs. Zella A. McBerty	490	976
John S. Gilder (recalled)	492	978
Edward L. Bettiker	492	978
James W. Powers (recalled)	495	981
A. W. Neeland	498	984
J. G. Wright	500	986
Frank E. Mills	502	988
M. L. Evely	505	991
John J. Findlater	507	993
Harry P. Prosser	509	995
Hubert E. Hartman	513	999
A. M. Wibel	515	1001
William H. Smith	517	1003
George B. Sawyer	521	1007
F. P. McBerty (recalled)	523	1009
Exhibit No. 1—U. S. Patent to Thompson, No. 347,140.	1	1021
Exhibit No. 2—U. S. patent to Thompson, No. 347,141.	6	1026
Exhibit No. 3—U. S. patent to Benardos, No. 363,320.	10	1030
Exhibit No. 4—U. S. patent to Thompson, No. 396,015.	17	1037
Exhibit No. 5—U. S. patent to Dewey, No. 432,727	21	1041
Exhibit No. 6—U. S. Patent to Coffin, No. 437,751	25	1045
Exhibit No. 7—U. S. patent to Thompson, No. 444,928.	27	1047
Exhibit No. 8—U. S. patent to Blanchard, No. 466,266.	31	1051
Exhibit No. 9—U. S. patent to Thompson, No. 496,019.	33	1053
Exhibit No. 10—U. S. patent to Lemp, No. 531,197	38	1058
Exhibit No. 11—U. S. patent to Lemp, No. 553,923	45	1065
Exhibit No. 12—U. S. patent to Robinson, No. 574,942.	50	1070
Exhibit No. 13—U. S. patent to Kleinschmidt, No. 616,436	56	1076
Exhibit No. 14—U. S. patent to Burton, No. 647,694	59	1079
Exhibit No. 15—U. S. patent to Perry, No. 670,808	63	1083
Exhibit No. 16—U. S. patent to Hunter, No. 690,958	67	1087
Exhibit No. 17—U. S. Patent to de Ferranti, No. 847,398	72	1092
Exhibit No. 18—U. S. patent to Rietzel, No. 928,701	78	1098
Exhibit No. 19—U. S. patent to de Ferranti, No. 1,148,221	85	1105
Exhibit No. 20—Certified copy of British patent to Parkinson, No. 14,536 of 1894	93	1111
Exhibit No. 21—Certified copy of British patent to de Ferranti, No. 11,921 of 1903	103	1118
Exhibit No. 22—Certified copy of British patent to Harmatta, No. 22,981 of 1903	109	1123

	Original.	Print.
Exhibit No. 23—Certified copy of French patent to Egel, No. 335,889	119	1131
Exhibit No. 24—Translation of French patent to Egel, No. 335,889	125	1136
Exhibit No. 25—Certified copy of French patent to Egel, No. 336,187	129	1139
Exhibit No. 26—Translation of French patent to Egel, No. 336,187	135	1144
Exhibit No. 27—Certified copy of German patent to Benardos, No. 50,909	139	1147
Exhibit No. 28—Translation of German patent to Benardos, No. 50,909	145	1152
Exhibit No. 29—Copy of Harmatta U. S. application as filed December 3, 1903	149	1155
Exhibit No. 30—Certified copy of file-wrapper and contents of de Ferranti U. S. patent No. 1,148,221	161	1167
Exhibit No. 31—Certified copy of file-wrapper and contents of de Ferranti U. S. application serial No. 668,464	317	1321
Exhibit No. 32—Certified copy of file-wrapper and contents of Harmatta U. S. patent No. 1,046,066	349	1353
Exhibit No. 33—Certified copy of file-wrapper and contents of interference No. 36,709, de Ferranti *vs.* Harmatta	465	1467
Exhibit No. 34—Certified copy of file-wrapper and contents of Rietzel U. S. patent No. 928,701	1	1719
Exhibit No. 35—Certified copy of file-wrapper and contents of interference No. 31,792, Rietzel *vs.* Harmatta.	119	1837
Exhibit No. 36—Certified copy of assignment of Harmatta application from Harmatta to Thompson Electric Welding Co	229	1948
Exhibit No. 37—Certified copy of assignment of Rietzel application from Rietzel to Thompson Electric Welding Co. of Maine	233	1952
Exhibit No. 38—Certified copy of assignment of Thompson Electric Welding Co. of Maine of all its assets to Thompson Electric Welding Co. of Massachusetts.	237	1956
Exhibit No. 39—Certified copy of assignment of Rietzel patent from Thompson Electric Welding Co. of Maine to Thompson Electric Welding Co. of Massachusetts.	240	1959
Exhibit No. 40—Certified copy of assignment of Harmatta patent and Rietzel patent from Thompson Electric Welding Co. to Thompson Spot Welder Co	249	1967
Exhibit No. 41—Certified copy of assignment of de Ferranti application from de Ferranti to F. L. Middleton.	253	1971
Exhibit No. 42—Certified copy of assignment of de Ferranti application from F. L. Middleton to Melville Church	256	1974
Exhibit No. 43—Certified copy of assignment of de Ferranti application from Melville Church to H. C. Milligan, trustee	259	1977

	Original.	Print.
Exhibit No. 44—Original license from H. C. Milligan, trustee, to Ford Motor Co. under de Ferranti application	262	1980
Exhibit No. 45—Certified copy of decree on mandate in Thompson Electric Welding Co. *et al.* from Barney & Berry, Inc., under Harmatta patent	264	1982
Exhibit No. 46—Certified copy of record in Thompson Electric Welding Co. *et al. vs.* National Enameling & Stamping Co	267	1985
Summons and service	267	1985
Bill of complaint	268	1986
Appearance	273	1991
Answer	273	1991
Replication	280	1998
Stipulation amending answer	281	1999
Affidavits of Frederick B. Bertrand, Jr.	281	1999
Notice of submission of decree	283	2001
Decree	283	2001
Clerk's certificate	284	2002
Exhibit No. 47—Certified copy of docket entries in Thompson Electric Welding Co. *et al. vs.* U. S. Metal Products Co	285	2003
Exhibit No. 48—Copy of pleadings in Thompson Electric Welding Co. *vs.* U. S. Metal Products Co	286	2004
Bill of complaint	286	2004
Answer	291	2009
Replication	297	2015
Exhibit No. 49—Dyer photographs A-1 to A-6 (not reproduced)	298	2016
Exhibit No. 50—Dyer photographs B-1 to B-14 (not reproduced)	299	2017
Exhibit No. 51—Dyer photographs C-1 to C-8 (not reduced)	300	2018
Defendant's Exhibit—Agreement of August 3, 1912, between Thompson Electric Welding Co. and American Electric Welding Company	301	2019
Defendant's Exhibit—Agreement of June 10, 1914, between Thompson Electric Welding Company and American Electric Welding Company	308	2026
Defendant's Exhibit—Tilghman correspondence	313	2031
Defendant's Exhibit—Rietzel sketch	323	2041
Exhibit No. 52—Certified copy of Harmatta Canadian application No. 108,990	325	2042
Exhibit No. 53—U. S. patent to Rietzel, 1,041,351	357	2070
Exhibit No. 72—McBerty letter to Mr. McGill, dated April 20, 1914	360	2073
Exhibit No. 73—McBerty letter to Mr. McGill, dated February 1, 1913	364	2077

	Original.	Print.
Defendant's Exhibit—Decision of board of examiners-in-chief in interference No. 36,709, de Ferranti *vs.* Harmatta	366	2078
Exhibit C, C, C, C—Patentblatt of June 22, 1904	369	2081
Exhibit E, E, E, E—Translation of Patentblatt of June 22, 1904	377	2085
Exhibit B, B, B, B—Patentblatt of March 14, 1906	381	2087
Exhibit D, D, D, D—Translation of Patentblatt of March 14, 1906	389	2091
Exhibit F, F, F, F—U. S. patent to Stanley, No. 1,176,614	394	2094
Proceedings in U. S. circuit court of appeals	398	2097
Appearance for appellant	398	2097
Order approving stipulation that 20 copies of record be filed	398	2097
Order assigning cause for hearing	399	2097
Argument and submission	399	2097
Decree	399	2097
Opinion, Knappen, J	401	2098
Clerk's certificate	409	2104
Writ of certiorari and return	410	2104

1 In the District Court of the United States for the Eastern District of Michigan, Southern Division.

In Equity.

THOMSON SPOT WELDER COMPANY, Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

Harmatta Patent No. 1,046,066.

Bill of Complaint.

[Filed December 1, 1917.]

To the Honorable the Judges of the District Court in and for the Eastern District of Michigan, Southern Division:

Thompson Spot Welder Company, a corporation duly organized and existing under the laws of the Commonwealth of Massachusetts, and an inhabitant and a citizen of said Commonwealth and of the United States, brings this its bill of complaint against Ford Motor Company, a corporation duly organized and
2 existing under the laws of the State of Michigan, and a citizen thereof, having a regular and established place of business at Detroit, within said Eastern District of Michigan, where it has committed acts of infringement hereinafter set forth, and thereupon the plaintiff for its cause of action states:—

1. That this is a suit in equity arising under the Patent Laws of the United States.

2. That it is informed and believes, and therefore avers, that on or prior to the third day of December, 1903, Johann Harmatta, then residing at Szepesvaralja, Austria-Hungary, was the original, sole and first inventor of certain new and useful improvements in electric welding not known or used by others in this country before his invention thereof, and not patented or described in any printed publication in this or any foreign country before his invention thereof, or more than two years prior to his application for Letters Patent of the United States next hereinafter mentioned, and not in public use or on sale in this country for more than two years before his said application, and not abandoned by him prior to his said application, and not first patented, or caused to be patented, by him or his legal representatives or assigns in any foreign country upon application filed more than twelve months prior to the filing of his said application in this country, and that being such original, sole and first inventor the said Harmatta, on said third day of December, 1903, made application in due form of law to the

Commissioner of Patents of the United States for Letters Patent for his said invention and duly swore to the specification thereof, and by valid assignment in writing assigned his invention and application and any Letters Patent which might be issued for said invention to the Thomson Electric Welding Company, a corporation of Massachusetts and requested the Commissioner of Patents to issue to said company any Letters Patent which might be granted on his said invention; whereupon such proceedings were had that on the third day of December, 1912, Letters Patent of the United States numbered 1,046,066 were duly issued for said invention and on said application to said Thomson Electric Welding Company.

3. That the said Thomson Electric Welding Company, by certain instruments in writing, granted certain exclusive rights under said Letters Patent to the Universal Electric Welding Com-
3 pany, a corporation of New York, as in and by said instrument or duly certified copies thereof here in court to be produced will more fully appear, and that the said Thomson Electric Welding Company and said Universal Electric Welding Company have assigned all their right, title and interest in and to said Letters Patent No. 1,046,066 and all their rights to damages and profits for infringement of said Letters Patent to the plaintiff, Thomson Spot Welder Company, by instruments in writing, as in and by said instruments, or duly certified copies thereof here in court to be produced, will more fully appear, whereby the plaintiff, the Thomson Spot Welder Company, became and now is the owner of said Letters Patent and entitled to recover all damages and profits due to it or to its predecessors in title to said Letters Patent on account of any infringement of its or their rights under said Letters Patent.

4. That it is informed and believes, and therefore avers, that the defendant has been after the issuance of said Letters Patent, and before the commencement of this suit, and still is, within said Eastern District of Michigan, and elsewhere in the United States, without license or permission of the plaintiff, or of its said predecessors in title to said Letters Patent, and in infringement of said Letters Patent, practicing the method of electric welding embodying the invention claimed in said Letters Patent, and making metal work, plates, sheets and articles also embodying the invention claimed in said Letters Patent, without license or permission of the plaintiff, or of its said predecessors in title, and in infringement of said Letters Patent and to the plaintiff's great damage.

5. That the defendant had been duly notified of said Letters Patent, and of its infringement thereof, in violation of the plaintiff's rights thereunder.

6. That it is informed and believes, and therefore avers, that the said defendant is prepared and ready and threatens to continue said infringement, as aforesaid, and unless it is restrained from so doing, the plaintiff will suffer great and irreparable damage from said unlawful acts of said defendant, and said defendant has derived and received, and is still deriving and receiving, from said infringing acts great gains and profits.

7. That the said Thomson Electric Welding Company and Universal Electric Welding Company filed a bill of complaint against Barney & Berry, Inc., a corporation organized and existing
4 under the laws of the Commonwealth of Massachusetts, on March 13, 1913, in the District Court of the United States for the District of Massachusetts, alleging infringement by said Barney & Berry, Inc., of the said Letters Patent, by practicing the method of said Letters Patent and by making and selling articles described and claimed in said Letters Patent; in said suit the defendant filed its answer on April 24, 1913, and a hearing on the merits was had in said District Court on April 1, 2, and 3, 1914; the District Court, on March 10, 1915, filed an opinion ordering that the bill of complaint be dismissed; the final decree dismissing the bill of complaint in said suit was entered in said District Court on March 24, 1915; the plaintiffs then took an appeal to the Circuit Court of Appeals for the First Circuit, which appeal was allowed by the District Court on March 26, 1915; the said Circuit Court of Appeals heard the argument on said appeal on April 29, 1915, and on October 5, 1915, handed down its opinion, a copy of which is hereto annexed, reversing the decree of the lower court and holding that said Harmatta patent was valid, and remanding the case to the District Court for further proceedings not inconsistent with its opinion; the mandate of said Circuit Court of Appeals was filed in the District Court on December 11, 1915; the plaintiffs, thereupon, on December 27, 1915, filed a motion for entry of a decree for an injunction, for an accounting for damages and profits and for costs; a hearing was had on said motion by said District Court on January 6, 1916; on January 25, 1916, a petition was filed in said Circuit Court of Appeals by the defendant, Barney & Berry, Inc., for leave to apply to the District Court for leave to amend its answer by including in the list of alleged anticipating patents the French patent No. 330,200, to Bouchayer, of March 13, 1903, and for leave to offer said patent in evidence, and to introduce proofs relating thereto, before the entry of a decree by the District Court; the Circuit Court of Appeals, on June 14, 1916, handed down its opinion, a copy of which is hereto annexed, denying the said petition of said defendant; the District Court, on July 11, 1916, handed down its opinion, a copy of which is hereto annexed, that the defendant has infringed the said
5 Letters Patent No. 1,046,066, and stating that on motion the decree asked for by the plaintiffs would be entered; whereupon, upon motion of the plaintiffs, an interlocutory decree for an injunction, for an accounting for damages and profits, and for costs, a copy of which decree is hereto annexed, was entered by the District Court on July 17, 1916, and on the same day an injunction was served on the said defendant, Barney & Berry, Inc., restraining it from infringement of said Letters Patent, a copy of which injunction is hereto annexed.

Wherefore, plaintiff prays that an account be taken of the profits received by the defendant and the damages of the plaintiff and its predecessors in title to said Letters Patent in the premises; that the defendant, its clerks, officers, attorneys, agents, servants and work-

men may be perpetually enjoined and restrained by the decree and injunction of this court from directly or indirectly infringing said Letters Patent; that the defendant may be decreed to pay the costs of this suit and may be also enjoined and restrained as aforesaid during the pendency of this suit, and that the plaintiff may have such other and further relief as to this Honorable Court may seem meet. Thomson Spot Welder Company, by Daniel J. Lyne, Secretary. Fish, Richardson & Neave, F. P. Fish, J. L. Stackpole, Stevenson, Carpenter, Butzel & Backus, Solicitors and of Counsel for Plaintiffs.

6 COMMONWEALTH OF MASSACHUSETTS,
County of ——, *ss:*

On this nineteenth day of November, 1917, before me appeared Daniel J. Lyne and made oath that he is the secretary of the Thomson Spot Welder Company, the plaintiff named in the foregoing bill; that he has read the foregoing bill subscribed to by him and knows the contents thereof, and that the same is true of his own knowledge, except as to matters which are therein stated on information and belief, and as to those matters he believes them to be true. Stewart C. Woodworth, Notary Public. (Seal.)

7 (Referred to in and made part of this Bill of Complaint.)

United States Circuit Court of Appeals for the First Circuit, October Term, 1914.

No. 1115.

THOMSON ELECTRIC WELDING COMPANY et al., Complainants, Appellants,

v.

BARNEY AND BERRY, INCORPORATED, Defendant, Appellee.

Appeal from the District Court of the United States for the District of Massachusetts.

Before Putnam, Bingham, and Aldrich, JJ.

Opinion of the Court.

[Filed October 5, 1915.]

PUTNAM, *J.:* This case alleges infringement of a patent for an invention, and the decree in the District Court was for the respondent. Thereupon the complainants appealed to us. The opinion of the learned judge of the District Court refers to the fact that there were twenty-one claims in all, the first sixteen being for a method or

process, and the last five for the product. The opinion also states that the complainant asked the court to consider only eight of the process claims, Nos. 3 to 6, 8, 9, 11, 12, and only four of the product claims, Nos. 17, 18, 19 and 21.

The alleged defenses are lack of invention, anticipation, invalidity because of the changes made in the application before issue of the patent, and non-infringement. We need not distinguish the
8 defenses by taking them each up, separately and specifically, because the whole case turns mainly about a single major proposition.

The opinion of the learned judge of the District Court says that the introductory statements in the patentee's specifications are that the inventions relate to the manufacture of metal articles of all kinds, and consist of a novel method of fastening their component parts together by process of electric welding, and also of the new articles produced thereby. He also observes that the inventions are further said to afford a cheap and practical substitute for riveting.

The brief for the complainants, now the appellants, states substantially the complainant's case, as follows:

"Harmatta's invention of the patent in suit was a new departure in the art of electric welding, which art had been created by the inventions of Prof. Elihu Thomson in 1886, shown and described in the Thomson patents Nos. 347,140 and 347,141.

"These Thomson patents show and describe for the first time the process of electric welding, but disclose only how it may be applied to joining the butt ends of two metallic rods together by passing an electric current of low voltage and high amperage from one rod to the other. The invention was a valuable one and went into commercial use, where the process became known as 'butt welding.' In this Thomson butt-welding process two metal rods are held by large copper electrode clamps, which are respectively the terminals of the electric circuit. When the current is turned on, it flows in its circuit through the electrode clamps and through the ends of the rods which protrude beyond the electrodes. As the rods are of smaller cross-section than the electrodes, they restrict the flow of the current to the smaller path which they afford, and they thereby concentrate the current and increase its heating effect.

"The resistance of the rods, together with the resistance at the joint between their abutting ends, increases the heating effect of the current, so that the ends of the rods are highly heated by the current and become plastic. The resistance and resulting heat at the joint are comparatively great because of the break in the continuity of the metallic circuits, and the consequent obstruction to the flow of the current.

9 "When the ends have thus become plastic, the rods are pressed bodily toward one another, the metal spreads and unites, with the result that the ends of the rods are joined by a weld. At the point where the joint is, the extruded metal forms an annular ridge.

"The characteristics of this butt-welding process are that—

"(1) The current is concentrated by the rods themselves, the ends of which are being welded together;

"(2) The welding heat is caused by the resistance of the metal between the clamps and by the resistance of the joint at the ends of the rods;

"(3) The area of the weld is determined by the area of the work, i. e., the ends of the rods;

"(4) The metal is extruded around the joint;

"(5) As the rods are united, they approach one another bodily, so that allowance for this always must be made.

"The plaintiff was formed to develop this Thomson invention. It has been engaged in the business of making and leasing machines for performing this process of butt welding. It has also granted licenses, as, for example, to the other complainant, the Universal Company, which had a license for spot welding, in 1909, which refers to prior licenses for 'spot welding,' granted in 1904.

"These Thomson patents protected this business, for they covered broadly the process and product of electric welding, as Thomson's invention was a true pioneer invention, having created the art of electric welding.

"But the underlying Thomson patents disclose as his only specific application of his fundamental invention one which was of limited utility, namely, the electric welding of the butt ends of two rods. But until Harmatta's invention, by which for the first time in the art it was practical and feasible by the use of new principles of operation to unite two thin plane sheets of metal together by electric welding, at any spot or at several spots of their contacting surfaces, no practical application of Thomson's invention of electric welding was made beyond that of the butt welding originally disclosed by him in his patents of 1886, in spite of the efforts of himself and other inventors."

In order to make clear the state of the art, it was necessary to explain, as we have just done, the primary inventions covered by the patents of Elihu Thomson of 1886. These constitute the foundation of the whole are of electric welding, and the patent now in suit, as other secondary patents to which we may now refer, must be regarded as developments or branches of Thomson's original invention, and as merely subsidiary inventions or improvements. There have been other subsidiary inventions, as, for instance, the lap-roller process, invented also by Thomson, by which the method of uniting the overlapping edges of two sheets of metal by a lap weld was devised, and by virtue of which some other secondary inventions were made practicable; all of which may be regarded as growing out of the inventions of 1886, but all of which were in different fileds from the spot-welding invention now under consideration, and were in no way subsidiary to it or incidental thereto, so that neither the one nor any of the others anticipated Harmatta's invention or were infringed by it or infringed it. Although all growing out of the same root, they were independent branches.

Consequently, we have only to consider further the following alleged defenses to the complainant's bill, namely:

That there is no patentable invention in welding separated spots;

That appellants' attempted distinctions are without basis;

That there was no distinction between roller electrodes covering the entire amount of the overlap, and Harmatta's process;

That Thomson's sheet patent No. 496,019 showed sheet metal united by soldering, and thus anticipated;

That it also showed electrodes having area less than the contracting area, as in Harmatta;

That the Thomson process is the same as Harmatta's, the difference being in the amount of pressure and current only, and that generally there was no showing of invention by Harmatta's patent;

That the appellee's does not infringe,

And that Harmatta's patent is invalid by reason of changes since the original application.

Returning to the defenses based on the roller-electrode process, or other processes devised with reference to overlapping sheets, it is all too plain that neither in its practical operation nor in its re-
11 sult was there any resemblance to the spot welding such as to require discussion. It is quite plain that the attempts in that direction were too experimental to form the basis of any sound defense; indeed that defense and the proposition of accomplishing the work by soldering were each in an art so remote as to require no attention beyond these brief reference thereto. These observations apply to all those lines of defense which rest upon the attempt to compare the size of contact spaces or areas mathematically, because the spot welding has nothing in common with such attempts; and, furthermore, a study of all these special defenses going to the proposition that spot welding, as shown by Harmatta, was in any way anticipated, falls to pieces, because there was nothing in them indicating an element of commercial success, and in this art, which was special and practicable, the art for rapid and inexpensive or cheap product was the first element of success. It is enough to repeat what we have already said generally; that is, in all these defenses of anticipation there is nothing which includes practicable utility.

Apparently much reliance is placed upon the claim that the application for the patent, during the many years it was pending, had been essentially changed, and so lost its validity. It originally embraced not only spot welding, but line welding, and line welding was not abandoned until after the alleged infringers in this case had constructed the machine with which they were operating when the bill was filed. The patent was applied for on December 3, 1903, and was not issued until December 3, 1912; but the claim for spot welding was always in the application. The alleged infringing machines were first constructed in 1908; in 1910 the application covered both spot welding and line welding. It was then amended by striking out all claims for line welding; so, therefore, perhaps, no profits can be recovered for anything done prior to the amendment, and it is a question to be considered whether or not an injunction can go against

machines constructed before the amendment was made, or, if at all, then to what extent.

We have not been called upon to give consideration to any questions of this character, and the bill and briefs in support of
12 the bill do not suggest any qualified decree in the matter whatever. The bill must, of course, be sustained, in view of the propositions we have already announced; and in view of the further proposition that the presumptions in favor of the patent are so far supported in this case by the insistency of the defense, and the comparatively enormous expense involved in maintaining it, we cannot question the present validity of the patent with reference to all propositions involved in the word "patentability." Nevertheless, the case is not put in such form as to enable us to go to a final judgment without further investigation. Indeed, it is not positively established what the proceedings of the respondents have been since the patent issued. The nearest that comes to it is the admission of the treasurer of the Barney & Berry Skate Works, the nominal respondents in this case, that the respondents had been using an infringing machine "before February, 1913," and "just before that time." There was also testimony of a witness for the complainant that he had seen the alleged infringing machines in operation on January 9, 1913, and that the ends of the electrodes on the machines were all about a quarter of an inch in diameter.

Under the circumstances, we can only enter a qualified judgment.

The decree of the District Court appealed from is reversed, and the case is remanded to that court for further proceedings not inconsistent with the opinion passed down on this fifth day of October, 1915; and the appellants recover their costs of appeal.

13 (Referred — in and made part of this Bill of Complaint.)

United States Circuit Court of Appeals for the First Circuit, October Term, 1915.

No. 1115.

THOMSON ELECTRIC WELDING COMPANY et al., Complainants, Appellants,

v.

BARNEY AND BERRY, INCORPORATED, Defendant, Appellee.

Application for Leave to Apply to District Court for Leave to Amend Answer.

Before Putnam, Bingham, and Aldrich, JJ.

Opinion of the Court.

[Filed June 14, 1916.]

Per Curiam: We have carefully examined the Bouchayer French patent, No. 330,200, relied upon by the defendants, in their applica-

tion for leave to apply to the District Court to amend their answer, as an anticipation of the patent in suit, No. 1,046,066, issued to Harmatta, and are of the opinion that it is not material upon the question, or, at the least, that it does not present such clear and convincing proof as is calculated to bring about a different result from that reached in our opinion handed down in this case on the fifth day of October, 1915. It seems rather to present a device, the essential features, mode of operation and the result of which are entirely different from those disclosed in the Harmatta patent.

Application denied.

14 (Referred to in and made part of this Bill of Complaint.)

District Court of the United States, District of Massachusetts.

In Equity.

No. 701.

THOMSON ELECTRIC WELDING COMPANY et al.

v.

BARNEY AND BERRY, INCORPORATED.

On Entry of Decree after Mandate.

Opinion.

[Filed July 11, 1916.]

DODGE, *J.:* The opinion of the Court of Appeals dated October 5, 1915, reversing the decree of this Court which held the patent in suit invalid, was followed by hearings in this Court in December, 1915, and January, 1916, upon draft decrees submitted by the respective parties for entry in pursuance of the directions given in said opinion. The defendant thereafter applied to the Court of Appeals for leave to amend its answer by setting up, as an anticipation of the patent in suit, a French patent to Bouchayer, which application was denied June 14, 1916.

The further proceedings in this Court in pursuance of the Court of Appeals decision on October 5, 1915, have been in substance as follows:

The plaintiff, submitting a draft decree adjudging the patent valid and providing in the usual terms for an injunction and accounting, stated that it had no further proof to offer and submitted that the facts of the infringement whereof it complained were shown by the record before the Appellate Court.

The defendant submitted two draft decrees; one dismissing the bill, the other, in the alternative, containing a proviso except-
15 ing from the operation of the injunction any machines, processes and products made or used before the amendment of the

patentee's application before the issue of the patent made March 31, 1910.

The defendant thereupon offered to prove, and the plaintiff conceded, though objecting that the facts conceded were immaterial, that the witness produced by the Toledo Company, whose testimony appears in the record, testified as to certain machines used for spot welding in 1908 and 1909 and prior to March, 1910; that said machines were in fact used for spot welding; and that when so used they practiced the Harmatta method with the Harmatta result, under any construction as to them of the claims in suit.

The defendant then offered in evidence the French patent to Bouchayer, since brought by it before the Court of Appeals in its application denied June 14, 1916, as above stated. This was excluded, as was also a translation of the patent into English, objected to by the plaintiff as incorrect; and evidence offered by the defendant to prove that the translation was correct.

The defendant offered expert evidence to explain the operation of the machine described in the patent in suit and its process. This was also excluded.

The defendant then moved for leave to amend its answer so as to set up said Bouchayer patent as an anticipation of the patent in suit; which motion was denied, this Court not regarding the opinion of the Court of Appeals as permitting such an amendment at that stage of the proceedings.

The defendant then called Mr. Cutler, a witness who testified on its behalf at the original hearing, and he was permitted to testify, against the plaintiff's objection, that in heating the skates referred to in his former testimony, the operator held in his hand the bottom portion thereof, intended to lie against the sole of the wearer's shoe; that during the heating operation the portion so held did not become too hot to be held without burning; and that the skates were white nickel-plated before welding, whereby the welding operation was materially facilitated.

The defendant then offered in evidence three United States patents to L. S. Lachman, Nos. 896,218, 904,881 and 904,882, for the
16 purpose of establishing the entry of other processes into the field prior to Harmatta's amendment of his application on March 31, 1910. These were excluded, the Court of Appeals opinion not being understood as permitting their introduction at that stage of the proceeding.

Nothing further was offered by either party.

The Court of Appeals opinion is understood to have settled the following matters for the purposes of the further proceedings therein ordered:

1. The process and product described in the patent in suit involve patentable invention.

2. They were not anticipated by anything in the prior art disclosed by the evidence.

3. Nor is the patent invalid by reason of any changes made before its issue in the original application for it.

4. Upon the evidence in the record, there has been at least some infringement by the defendant of the claims in suit. If, in the view of the Appellate Court, the briefs had failed to show any infringement, its opinion could not have declared, as it does, that the bill "must, of course, be sustained." Whether infringement had been proved or not, supposing the patent valid, was a question fully argued on the appeal upon such evidence as both parties had seen fit to introduce, as the record and briefs show; and as to a principal part of the alleged infringing manufacture, the opinion of this Court that it had not infringed the patent, even if valid, had been stated.

Dismissal of the bill on the ground, now asserted by the defendant, that no infringement had been proved, would therefore be a proceeding inconsistent with the Court of Appeals opinion; under which the further inquiry directed by this Court is to determine two questions only (1) whether or not the decree should be limited so as not to exclude from the profits recoverable under its profits "for anything done prior to the amendment" of the patentee's application in 1910; (2), whether from the injunction it is to contain there should be any exemption with respect to "machines constructed before the amendment was made," and what, if any.

The patent in suit was issued December 3, 1912. This bill was filed March 13, 1913. The patent is not for a machine, but for the described process of spot welding, and for the product thereby obtained.

17 Between the above two dates the defendant made articles like loom parts marked "Exhibits 8" and "9," and the skates marked "Exhibits 27," "28" and "32." In making such articles it used a machine which it had installed in May, 1911, and used ever since. This machine it bought of the Toledo Electric Welder Company, which, though not a nominal party, is defending this suit. All these facts seem to me established by the answers to the plaintiff's interrogatories in connection with the evidence in the record. There was no dispute as to any of them at the trial. The Court of Appeals opinion is not understood as deciding anything to the contrary.

No injunction is sought against the manufacture and sale of any machine, nor against the use of any, except to the extent that it may be used in following the patented process or in producing articles spot welded according to that process. The infringement alleged in the bill is "using a method of electric welding and making and selling metal work, plates and articles embodying the invention claimed in said Letters Patent." Against such infringement only is any injunction sought, or—in other words, against using the patented method or making the patent product, whether with the above or with any other machine.

The validity of the patent being now established, I am unable to doubt that loom parts like Exhibits 8 and 9 infringe the product claims in suit, or that in making them the defendant infringed the process claims in suit. Except as below stated the defendant is not understood to deny that said claims have been infringed by the manufacturer of said loom parts.

As to the skates, Exhibits 27, 28 and 32, the defendant contends that in making them there was no infringement either of the process or of the product claims, because the spot welds uniting their parts are not surrounded by unwelded areas, but are, on the contrary, continuous and overlapping so as to form practically continuous lines; and because they were made by the operator one after the other, each before its predecessor had time to cool, so as to form what is in effect a "line" as distinguished from a "spot" weld.

While the above may apply to a considerable proportion of the spot welds in these skates, it is not true of all; there are enough isolated spot welds to prevent the conclusion that the skates
18 do not infringe even if the above contention could otherwise prevail. And, taking the facts as to the making of those spot welds in the skates which are so isolated from each other to be as the defendant claims, some at least of the claims in suit, such as claims 3, 8, 9, 11 and 12, seem to me incapable of a construction according to which spot welding so performed would not infringe them, consistently with the Court of Appeals opinion. I am obliged to agree with the plaintiff that the "line welding," referred to in that opinion, all claims for which are therein said to have been stricken out of Harmatta's application in 1910, is line welding of the kind effected by the bevelled roller electrodes described in Harmatta's original application, and is not that effected by making a line of overlapping, single spot welds.

The terms of the plaintiff's proposed decree, in connection with the pleadings, sufficiently show that no recovery of profits arising from any use of the patented process before the patent issued on December 3, 1912, nor for any articles produced before that date by said process is to be had. That no such recovery is sought has been expressly stated on the plaintiff's behalf. A recovery of profits "for anything done prior to the amendment of 1910, as suggested by the Court of Appeals in its question (1) above, is thus not to be apprehended from the entry of said decree.

As to the other question which the opinion directs to be considered, "whether or not an injunction can go against machines constructed before the amendment was made," the defendant has contended that the result of such consideration must be to prevent any injunction against its use of the Toledo machine above mentioned, or of any similar machine constructed before said amendment; and this was urged by it as requiring dismissal of the bill. With this contention, as has been stated, I am unable to agree.

There being no alleged infringing machines, strictly speaking, in the case, the Court of Appeals must be understood to mean, by its use of those words, machines like the defendant's, capable of infringing use in performing the patented process. The inquiry directed is therefore understood to be, whether there is evidence requiring the specific exemption from the terms of any in-
19 junction against the defendant of the use of any particular machine or machines. The only machine with whose use the proposed injunction will interfere, so far as now shown, is the defendant's machine installed, as stated, in May, 1911, and I do

not find evidence in the record sufficient to prove that this machine was constructed before March 31, 1910, the date of the amendment referred to. I do not understand the opinion as suggesting that the defendant may be left free to produce the patented product by the patented process upon other machines, in fact built before that date, if it can find them.

The draft decree submitted by the plaintiff is approved and may be entered upon motion to that effect.

(Referred to in and made part of this Bill of Complaint.)

Interlocutory Decree.

[Filed July 17, 1916.]

DODGE, *J.*: This cause came on to be further heard upon the pleadings and proofs and upon the mandate of the Circuit Court of Appeals for the First Circuit, and counsel for the respective parties having been heard, now, upon consideration thereof, it is hereby ordered, adjudged and decreed that the Letters Patent of the United States referred to in the complainant's bill granted to the Thomson Electric Welding Company, as assignee of Johann Harmatta, No. 1,046,066, dated December 3, 1912, are good and valid; that said Johann Harmatta was the original and first inventor of the improvements described in said Letters Patent; that the complainant the Thomson Electric Welding Company is the true and lawful owner of said Letters Patent; that the complainant the Universal Electric Welding Company is a licensee under said Letters Patent; and that the defendant, Barney and Berry, Incorporated, has infringed claims 3, 4, 5, 6, 8, 9, 11, 12, 17, 18, 19 and 21 of said Letters Patent and upon the exclusive rights of the complainants under the same.

20 It is further ordered, adjudged and decreed that the complainants recover of the defendant the gains and profits which said defendant has derived, received or made by reason of its infringement of said claims of said Letters Patent, and that said complainants also recover any and all damages which they have sustained by reason of said infringement of said claims by the defendant; and this cause is hereby referred to —— ——, as a master of this court, to take and state an account of such gains and profits, and to assess such damages and to report thereon with all convenient speed. And the officers and employes of the defendant are hereby directed and required to attend before said master from time to time as required, and to produce before him such books, papers and documents as relate to the matters at issue, and to submit to such oral examination as the master may require.

It is further ordered, adjudged and decreed that a perpetual injunction be issued out of and under the seal of this Court against the said defendant, Barney and Berry, Incorporated, strictly enjoining and restraining it, its clerks, attorneys, agents, servants and workmen from directly or indirectly infringing said Letters Patent,

and from practicing the process of electric welding containing or embodying the invention described and patented in said Letters Patent and referred to in the claims thereof numbered 3, 4, 5, 6, 8, 9, 11 and 12, and from directly or indirectly making, constructing, using or selling metal articles containing or embodying the invention described and patented in said Letters Patent, and referred to in the claims thereof numbered 17, 18, 19 and 21.

It is further ordered, adjudged and decreed that the complainants recover of the defendants their costs of suit to be taxed. By the Court. John E. Gilman, Jr., Deputy Clerk.

21 District Court of the United States, District of Massachusetts.

I, William Nelson, Clerk of said Court, do hereby certify that the foregoing is a true copy of the Interlocutory Decree, entered July 17, 1916, in the cause entitled No. 701, Equity Docket, Thomson Electric Welding Co. et al. v. Barney and Berry, Inc., now pending in said Court.

In testimony whereof, I hereunto set my hand and affix the seal of said District Court, at Boston, in said District, this twenty-first day of July, A. D. 1916. William Nelson, Clerk. (Seal.)

22 (Referred to in and made part of this Bill of Complaint.)

Writ of Injunction.

United States of America,
Massachusetts District, ss:

The President of the United States of America to Barney and Berry, Incorporated, a corporation duly organized and existing under the laws of the Commonwealth of Massachusetts and a citizen thereof, having a regular and established place of business at Springfield, within said Commonwealth and District of Massachusetts, your agents and servants, Greeting:

Whereas, Thomson Electric Welding Company, a corporation duly organized and existing under the laws of the Commonwealth of Massachusetts, an inhabitant and citizen of said Commonwealth and of the United States, and Universal Electric Welding Company, a corporation duly organized and existing under the laws of the State of New York and an inhabitant and a citizen of said State and of the United States, have exhibited their Bill of Complaint before the Justices of our Circuit Court of the United States for the First Circuit, begun and holden at Boston, within and for the District of Massachusetts, on the first Tuesday of December, A. D. 1912, against you the said Barney and Berry, Incorporated, praying to be relieved touching the matters therein complained of, and whereas, by an order of said court, made on the seventeenth day of July, A. D. 1916, it was ordered that a writ of injunction issue under the Seal of the said Court, to restrain you and each and every

— of you, from doing all the matters and things from the doing of which you are prayed to be restrained in said Bill, according in full with the prayer of said Bill.

23 We therefore, in consideration thereof, enjoin and command you each, and every — of you that from and immediately after the receipt and notice of this our Writ by you, you, your clerks, attorneys, agents, servants and workmen shall not directly or indirectly infringe Letters Patent No. 1,046,066 and shall not practice the process of electric welding contained or embodied in the invention described and patented in said Letters Patent and referred to in the claims thereof numbered 3, 4, 5, 6, 8, 9, 11 and 12, and shall not directly or indirectly make, construct, use or sell metal articles containing or embodying the invention described and patented in said Letters Patent and referred to in the claims thereof numbered 17, 18, 19 and 21.

Whereof, you are not to fail on pain of ten thousand dollars, to be levied on your and each of your goods, chattels, lands and tenements, to our use.

Witness the Honorable James M. Morton, Jr., at Boston, the seventeenth day of July in the year of our Lord one thousand nine hundred and sixteen. William Nelson, Clerk.

A true copy. Attest: George A. Crockwell, Deputy U. S. Marshal.

UNITED STATES OF AMERICA,
Massachusetts District, ss: Springfield, July 17, 1916.

I hereby certify that I have notified the within-named respondent on the seventeenth day of July, A. D. 1916, at eight o'clock in the afternoon, by delivering in hand to Walter P. Dodge, its Treasurer, at Springfield, a true and attested copy of this Writ of Injunction. John J. Mitchell, U. S. Marshal, by Edward J. Leyden, Deputy.

Fee:

Service	$2.00
Copy	.30
Expenses	.10
Telephone	.50
	$2.90

24

Amended Answer.

(Filed April 3rd, 1919.)

The Amended Answer of Ford Motor Company, Defendant to the Bill of Complaint of Thomson Spot Welder Company, Plaintiff.

This defendant answering says:

1. Defendant has no knowledge as to the citizenship and residence of the plaintiff, nor as to the incorporation of the plaintiff, as in the

bill of complaint alleged, and leaves plaintiff to make such proof thereof as it may be advised. Defendant admits that it is a corporation, created and existing under the laws of the State of Michigan, and that it is a citizen and inhabitant of said State. Defendant admits that this is a suit in Equity arising under the patent laws of the United States.

2. Defendant admits the issue of letters patent of the United States, No. 1,046,606, dated December 3, 1912, to Thomson Electric Welding Company, as the assignee of Johann Harmatta, but denies all the other allegations in Paragraph 2 of the bill of complaint, and leaves the plaintiff to make such proof thereof as it may be advised.

3. Defendant is not informed, save by the bill of complaint, whether or not the plaintiff has any such rights or interests as are set forth in Paragraph 3 of said bill and therefore denies all of the allegations of said Paragraph 3, and leaves the plaintiff to make such proof thereof as it may be advised.

4. Defendant denies that it has made, used or sold any articles covered by said letters patent No. 1,046,066 or that it has practiced the process set forth and claimed in said letters patent, in this judicial district or elsewhere, and denies that it has in any respect infringed said letters patent or any rights of the plaintiff therein, and denies that it has in any way damaged the plaintiff.

5. Defendants, upon information and belief, denies that the plaintiff has duly notified it of said letters patent No. 1,046,066, and of its infringement of the rights of the plaintiff thereunder, as in Paragraph 5 of the bill of complaint alleged.

25 6. Defendant denies that it has infringed, or is infringing, said letters patent No. 1,046,066, or that it is prepared and ready to infringe the same; denies that it has derived and received and is still deriving and receiving any gains or profits by reason of the infringement of said letters patent, or that it has in any way damaged the plaintiff by the infringement of said letters patent, or otherwise.

7. Defendant is not informed, save by the bill of complaint, as to the alleged proceedings set forth in Paragraphs 7 and 8 of the bill of complaint, and leaves the plaintiff to make such proof thereof as it may be advised; but defendant denies that it was a party or privy to any such litigation referred to in Paragraphs 7 and 8 of the bill of complaint, and denies that it is in any way bound or prejudiced thereby.

8. Defendant, further answering on information and belief, avers that the said letters patent No. 1,046,066 are invalid and void for the following reasons:

(*a*) Because the things patented in and by said letters patent No. 1,046,066, or substantial and material parts thereof claimed therein as new, had, long prior to the alleged invention and discovery thereof by the said Johann Harmatta, been patented or described or contained in letters patent of the United States and in lettters patent of foreign countries, numbered and dated as follows, and granted to the following named patentees, viz.:

United States Letters Patent.

No.	Date.	Patentee.
347,140	Aug. 10, 1886	Elihu Thomson.
347,141	Aug. 10, 1886	Elihu Thomson.
363,320	May 17, 1887	Nicholas De Benardos and Stanislas Olezewski.
396,015	Jan. 8, 1889	Elihu Thomson.
432,727	July 22, 1890	Mark W. Dewey.
437,571	Sept. 30, 1890	Charles L. Coffin.
444,928	Jan. 20, 1891	Elihu Thomson.
466,266	Dec. 29, 1891	George W. Blanchard.
496,019	Apr. 25, 1893	Elihu Thomson.
531,197	Dec. 18, 1894	Hermann Lemp.
553,923	Feb. 4, 1896	Hermann Lemp.

26

574,942	Jan. 12, 1897	William Robinson.
616,436	Dec. 20, 1898	Henry F. A. Kleinschmidt.
647,894	Apr. 17, 1900	George D. Burton.
670,808	Mar. 26, 1901	John C. Perry.
690,958	Jan. 14, 1902	Rudolph M. Hunter.
874,398	Dec. 24, 1907	Sebastian Ziani De Ferranti.
1,148,821	July 27, 1915	Sebastian Ziani De Ferranti.
928,701	July 20, 1909	Adolph F. Rietzel.

French Letters Patent.

No.	Date.	Patentee.
335,889	Oct. 13, 1903	W. Egel. (Delivered Dec. 21, 1903, Published Feb. 18, 1904.)
336,187	Oct. 13, 1903	W. Egel. (Delivered Jan. 7, 1904, Published Mar. 1, 1904.)

British Letters Patent.

No.	Date.	Patentee.
14,536	July 25, 1894	Charles F. Parkinson.
11,921	May 25, 1903	Sebastian Z. De Ferranti.
22,981	Oct. 23, 1903	Johann Harmatta.

German Letters Patent.

No.	Date.	Patentee.
50,909	Feb. 19, 1890	Nikolas von Benardos.

(*b*) Because the thing patented in and by said letters patent No. 1,046,066, or substantial and material parts thereof claimed therein as new, had, long prior to the alleged invention or discovery thereof by said Johann Harmatta, been shown and described in the following printed publications, viz.:

27 *Publications.*

British Patent No. 11,921, May 25, 1903, to Sebastian Z. De-Ferranti.

British Patent No. 14,536, July 25, 1894, to Charles F. Parkinson.

German Patent No. 50,909, Feb. 19, 1890, to Nikolas von Benardos.

(*c*) Because, prior to the alleged invention of the said improvements by the said Johann Harmatta, the same were invented by or known to and used by the following named persons or corporations at the following named places, to-wit:

Fred P. McBerty, of Warren, Ohio, at said Warren and elsewhere in the State of Ohio.

Central Oil & Gas Stove Co., of Gardner, Massachusetts, at said Gardner and elsewhere in the State of Massachusetts.

William Robinson, of Boston, Massachusetts, at said Boston and elsewhere in the State of Massachusetts, and at Brooklyn, New York, and elsewhere in the State of New York.

Elihu Thomson, of Lynn, Massachusetts, at said Lynn and elsewhere in the State of Massachusetts.

Adolph Rietzel, of Lynn, Massachusetts, at said Lynn, and elsewhere in the State of Massachusetts.

Thomson Electric Welding Company, of Lynn, Massachusetts, at said Lynn and elsewhere in the State of Massachusetts.

Sebastian Z. De Ferranti, of Hampstead, London, N. W., England, at said Hampstead and elsewhere in the Kingdom of Great Britain.

(*d*) Because, for more than two years prior to the application of the said Johann Harmatta for said letters patent No. 1,046,066, the said invention or improvements claimed in and covered by said letters patent were in public use and on sale in the United States, by the following named persons, or concerns, at the following named places, viz.:

Fred P. McBerty, of and at Warren, Ohio.

Warren Electric & Specialty Company, of and at Warren, Ohio.

28 Central Oil & Gas Stove Co., of and at Gardner, Massachusetts.

Elihu Thomson, of and at Lynn, Massachusetts.

Thomson Electric Welding Company, of and at Lynn, Massachusetts.

William Robinson, of and at Boston, Massachusetts, and at Brooklyn, New York.

Adolph Reitzel, of and at Lynn, Massachusetts.

(*e*) Because, the said Johann Harmatta was not the original, true and first inventor of the inventions or improvements set forth and claimed in said letters patent No. 1,046,066, but that said letters patent were surreptitiously and unjustly obtained for that which was in fact invented by another, to-wit, by Sebastian Z. De Ferranti, of Hampstead, London, N. W., England, who was using reasonable diligence in adapting and perfecting the same.

(*f*) Because, the subject matter set forth and claimed in said letters patent No. 1,046,066 was not set out in the application for said letters patent No. 1,046,066, as filed, as the invention of said Johann Harmatta and was not covered by the oath of said Johann Harmatta to said application, as required by the Statutes of the United States and the Rules of Practice of the United States Patent Office, made pursuant thereto, in such case made and provided, but such subject matter was inserted by amendment to said application, without the authority or sanction of said Harmatta, and without his oath as required by said Statutes and Rules.

(*g*) Because, of the abandonment to the public of the subject matter of said letters patent No. 1,046,066 by reason of the delay of the owner of the application for said letters patent to assert claim to such subject matter until more than a year after knowledge of the issue and publication of letters patent No. 928,701, granted July 20, 1909, to the predecessor in title of the plaintiff, Thomson Electric Welding Company, as the assignee of Adolph F. Rietzel; and defendant avers that the plaintiff is now estopped to assert the validity of said letters patent No. 1,046,066 as against the defendant or as against the public generally by reason of such delayed assertion of claim and such abandonment.

(*h*) Because, in view of the knowledge of persons skilled in the art at the date of the alleged invention of the said Harmatta, the things attempted to be claimed and covered by said letters patent No. 1,046,066, did not embody or involve any substantial variation or change from said prior art, and did not involve the exercise of the inventive faculty or constitute patentable subject matter.

(*i*) Because, by reason of the representations and declarations made by the plaintiff or its predecessor in title to the Commissioner of Patents that Adolph F. Rietzel was the prior inventor over Johann Harmatta, the patentee of the Harmatta patent in suit, in respect of the subject matter of the said Harmatta patent, as shown by the record of the application for the Rietzel patent No. 928,701, and by the record of the proceedings in Patent Office Interference No. 31,792, between the said Rietzel patent and the application for the said Harmatta patent, the plaintiff is now estopped to deny the prior inventorship of the said Rietzel over said Harmatta and also to assert the validity of said Harmatta patent as against this defendant or any other member of the public.

9. Further answering, defendant is informed and believes, and therefore avers, that said letters patent No. 1,046,066 are now involved in an interference proceeding in the United States Patent Office with a pending application of the hereinabove mentioned Sebastian Ziani De Ferranti, which proceeding is known and designated as Interference No. 36,709, De Ferranti vs. Harmatta, and is pending and undetermined; that in said interference proceeding the said De Ferranti claims priority of invention over Harmatta in respect to the subject matter of said Harmatta patent No. 1,046,066; that defendant claims the benefit of all the rights of said De Ferranti in respect of said invention, application and interference proceeding, and of all the rights of said De

Ferranti under his aforesaid British letters patent No. 11,921, of May 25, 1903, and under his United States letters patent No. 874,398, of December 24, 1907, and No. 1,148,221, of July 27, 1915, and under Section 4887 of the Revised Statutes of the United States, and the International Convention, by virtue of a license from said De Ferranti to this defendant.

10. Further answering, defendant denies that the plaintiff is entitled to any injunction, provisional or permanent, or to any accounting or recovery, or other relief, or to any decree as
30 prayed for in the bill of complaint, and prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained. Ford Motor Company, by Barthel, Flanders & Barthel, its solicitors. Melville Church, of Counsel.

Plaintiff's Interrogatories.

Harmatta Patent No. 1,046,066.

The following interrogatories are propounded by the plaintiff to be answered by Henry Ford of the Ford Motor Company, defendant, or such other officer of said defendant company, if any, who may have better or more complete knowledge concerning the matters inquired about.

Int. 1. Has the defendant at any time during the period from December 3, 1912, to the date of filing of the bill of complaint herein, used at its factory in Detroit, Michigan, one or more electric welding machines for electrically welding sheet metal articles, which machine or machines were purchased from the Winfield Electric Welding Machine Company prior to December 16, 1916?

Int. 2. Did said machines, or any of them, comprise a base portion having a horizontally-extending arm or bracket secured thereto in which was mounted one work-engaging electrode and having a second arm or bracket in which was mounted a second work-engaging electrode capable of being reciprocated towards the first electrode?

Int. 3. Did one or both of said electrodes have its tip or work-engaging end tapered?

Int. 4. Describe the electrodes used in said machines, and state their shape and dimensions.

Int. 5. Were said electrodes composed principally of copper?

31 Int. 6. Were the electrodes connected respectively to the terminals of a secondary circuit of an electric transformer?

Int. 7. During the period in question what was the means employed in said machines for moving one electrode toward and from the other electrode?

Int. 8. During the period in question was there an operating switch in the primary circuit of the transformer of each of said machines for controlling the supply of electric current to said electrodes?

Int. 9. Did the operator weld together with these machines, or any of them, two or more superimposed thicknesses of sheet mtal,

constituting the work, by placing the work between the electrodes and then operating the machine to reciprocate the movable electrode to press the work between the ends of the electrodes and to pass the current through the two electrodes and the work at the place between the electrodes?

Int. 10. Did the passage of the current through the work and the pressure exerted by the electrodes result in welding the thicknesses of metal together at the locality or spot between the electrodes, but at no other place?

Int. 11. Did the operator, after obtaining the welding heat and pressure, operate the machine to cut off the current between the electrodes and to seperate the electrodes?

Int. 12. During the period from December 3, 1912, to the date of filing the bill of complaint herein were the said machines, or any of them, operated at any time as described in the foregoing questions and answers in the welding together of two or more thicknesses of metal in the manufacture of automobiles and of parts thereof?

Int. 13. In the manufacture of automobiles and parts thereof was the operation of welding two or more thicknesses of metal together at particular places repeated a number of times with each article?

Int. 14. If your answer to Interrogatory 13 is in the affirmative, describe the position and number of such welds upon automobiles and parts so manufactured.

Int. 15. Were the welds, or any of them, made as described in the foregoing questions and answers separated from one another?

Int. 16. During the period from December 3, 1912, to the date of filing of the bill of complaint herein did the defendant
32 sell automobiles or parts thereof in which two or more thicknesses of sheet metal were welded as described in the foregoing questions and answers?

Int. 17. Explain in detail the process or processes which the defendant has used at its factory in Detroit, Michigan, between December 3, 1912, and the date of filing of the bill of complaint herein to weld together electrically two or more superimposed thicknesses of sheet metal at a number of spots or places in their meeting surfaces, and state to what articles or parts of automobiles said process or processes were applied by the use of machines above referred to.

Int. 18. Has the defendant used at its factory in Detroit, Michigan, during the period in question a machine or machines substantially like that shown in the attached picture, Plaintiff's Exhibit No. 1; to weld together electrically two or more superimposed thicknesses of sheet metal at a number of spots or places in their meeting surfaces, and if not, how did the machines so used differ from that shown in this picture?

Int. 19. Attached hereto is Plaintiff's Exhibit No. 2; is this exhibit, so far as the welds are concerned, a fair example of a product produced by the defendant as a result of practicing the electric welding process described in the foregoing questions and answers,

or any of them, by means of a machine or machines described in such questions and answers.

The said Henry Ford, or other person answering these interrogatories, is required to answer each and every one of said interrogatories. Fish, Richardson & Neave, Stevenson, Carpenter, Butzel & Backus, Solicitors for Plaintiff.

It is hereby ordered that the foregoing interrogatories be answered, or good reasons be shown for not answering said interrogatories under and in accordance with the provisions of Equity Rule 58. Arthur J. Tuttle, U. S. District Judge.

Service of the foregoing interrogatories accepted this twenty-second day of January, 1918. Barthel, Flanders & Barthel, Solicitors for Defendant.

33 **Plaintiff's Exhibit No. 1.**

(Here follows Plaintiff's Exhibit No. 1, marked page 33.)

34 **Defendant's Answers to Plaintiff's Interrogatories.**

District Court of the United States, Eastern District of Michigan, Southern Division.

In Equity.

FRANK L. KLINGENSMITH, vice-president and treasurer of the Ford Motor Company, defendant, makes answer to the interrogatories propounded by the plaintiff, as follows:

Ans. to Int. No. 1. Yes.

Ans. to Int. No. 2. All machines used are designed in this manner.

Ans. to Int. No. 3. Yes.

Ans. to Int. No. 4. The electrodes on Winfield welders in use at the Ford plant are approximately 1 inch through at the base and 3 inches in length. In some cases they taper from the base, have truncated cone tops. In other cases the electrodes are cylindrical with or without truncated cone tops. These electrodes differ in shape and dimensions for various machines.

Ans. to Int. No. 5. Yes.

Ans. to Int. No. 6. Yes.

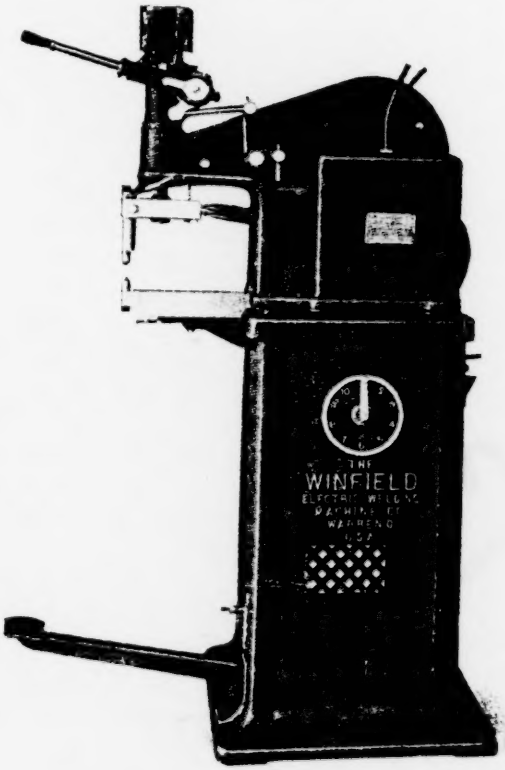
Ans. to Int. No. 7. By means of a lever operated by a foot treadle.

Ans. to Int. No. 8. Yes.

Ans. to Int. No. 9. Yes.

Ans. to Int. No. 10. This is a matter of opinion. The metal is apparently welded together over some portion of the area between the electrodes. Whether there is any welding beyond that locality I do not venture an opinion.

PLAINTIFF'S EXHIBIT No. 1.



Ans. to Int. No. 11. The current is cut off automatically when the operator removes his feet from the foot pedal. This action allows the upper electrode to return to its normal position.

Ans. to Int. No. 12. Yes.

Ans. to Int. No. 13. Yes.

35 Ans. to Int. No. 14. The number of such welds varies from one to a dozen or more.

Ans. to Int. No. 15. Yes.

Ans. to Int. No. 16. Yes.

Ans. to Int. No. 17. All of such welding is done on Winfield electric welders, the action of which has been described in the foregoing answers; and the parts of automobiles to which the process has been applied embraces mufflers, radiators, fenders, bodies and other parts.

Ans. to No. 18. Machines used are substantially like that shown in Exhibit No. 1.

Ans. to Int. No. 19. Yes.

Dated, February 5, 1918. Frank L. Klingensmith, Vice-President and Treasurer.

STATE OF MICHIGAN,
County of Wayne, ss:

Frank L. Klingensmith, being duly sworn, deposes and says that he is the vice-president and treasurer of Ford Motor Company, the defendants in the above-entitled cause; that the foregoing answers to interrogatories made and subscribed to by him he verily believes to be true. Frank L. Klingensmith.

Subscribed and sworn to before me this seventh day of February, A. D. 1918. Herbert E. Hartman, Notary Public, Wayne County, Michigan.

36

Stipulation as to Copies of Patents Taking of Depositions and Civil.

It is hereby stipulated and agreed by and between counsel for the respective parties hereto, subject to the approval of the court, as follows:

I. That the usual printed Patent Office copies of United States and foreign patents may be offered and received in evidence with the same force and effect as the originals or duly certified copies thereof, subject, however, to corrections by comparison with such originals or certified copies; and that the date of application printed upon any such copy of patent shall be prima facie evidence of the date of the application for such patent.

II. That either party may take the depositions of witnesses (including experts whose testimony shall be directed to matters of opinion) under the provisions of Sections 863 et seq. of the Revised Statutes of the United States; those taken by the plaintiff in support of its prima facie case to be taken within thirty days of

the date hereof; those of the defendant within sixty days after the closing of plaintiff's prima facie case, and those of the plaintiff in rebuttal within thirty days after the closing of the depositions so taken in behalf of the defendant.

III. That the court be requested to fix a day for trial to enable any witnesses that either party may desire to be called to be examined in open court in July, 1918, or at such earlier time as the business of the court may permit. J. L. Stackpole, Counsel for Plaintiff. Melville Church, Counsel for Defendant. Boston, Massachusetts, February 20, 1918.

37 **Stipulation.**

It is stipulated and agreed that the plaintiff's interrogatories and the defendant's answers thereto, already filed, may be received in evidence with the same force and effect as if the questions and answers had been made and given by a duly taken deposition. J. L. Stackpole, Counsel for Plaintiff. Melville Church, Counsel for Defendant.

Stipulation Substituting Amended Answer for Original Answer.

(Filed April 3rd (1919.)

It is hereby stipulated and agreed by and between counsel for the respective parties hereto that the accompanying amended answer of the defendant may be filed as a substitute for the defendant's original answer and that an order to this effect may be entered without further notice. J. L. Stackpole, Counsel for Plaintiff. Melville Church, Counsel for Defendant. Barthel, Flanders & Barthel, Solicitors for Defendant. Stevenson, Carpenter, Butzel & Backus, Solicitors for Plaintiff.

38

Memorandum Opinion.

(Filed Oct. 5, 1920.)

KILLITS, *J.:* This is an action for infringement of United States Patent No. 1,046,066, allowed December 3, 1912, to the plaintiff's predecessor in title, as assignee, upon an application filed December 3, 1903, by Johann Harmatta. The patent is one for improvements in electric welding and has sixteen claims for process and five for product. The specific character of welding involved is that known as spot-welding. The complaint alleges that all claims are infringed. Counsel for plaintiff treat and build their argument upon three claims as typical, namely:

"3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immedi-

ately opposed surfaces so as to limit the union of the pieces to a spot or spots.

8. The method of electrically welding two plates or sheets of metal together face to face between electrodes, consisting in restricting the area of contact of an electrode with said plates to a spot, passing a heating electric current from said electrode to the co-operating electrode through said spot to heat the work to welding temperature and applying pressure to the work in line with said spot to effect a welding of one plate to the other.

17. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on
39 the meeting surfaces being separated from one another by distinct unwelded areas."

The defendant does not actively question title nor the truth of the more or less formal allegations of the complaint. The special defenses which we deem important are:

(*a*) Anticipation in the prior art, citing patents and publications which are hereafter discussed in some degree;

(*b*) Reduction to successful use prior to Harmatta's crucial dates by parties named, those particularly depended upon being F. B. McBerty at Warren, Ohio, and Adolf Rietzel, at Lynn, Massachusetts;

(*c*) The subject-matter, as finally set forth and claimed in the grant, was not set out in the application and was not subsequently entered under cover of an oath of the inventor in the process of amendment;

(*d*) Lack of substantial variation from prior uses and publications, and hence lack of invention;

(*e*) Plaintiff, by the declarations and representations first made in its behalf, as assignee of United States Patent 928,701 to Adolf Rietzel, issued July 20, 1909, upon an application filed February 24, 1905, and thereafter in interference proceedings between the Rietzel grant and the Harmatta application, is estopped to deny that Harmatta was effectively anticipated by Rietzel, and may not, therefore, assert the validity of the patent in suit.

The patent before us was adjudicated in 1915 at the suit of The Thomson Electric Welding Company (predecessor and privy in title to the plaintiff here) against Barney & Berry by a decision in the First Circuit Court of Appeals, opinion by Judge Putnam (227 Fed. Rep. 428).

There is substantial identity between The Thomson Electric Welding Company and plaintiff, wherefore, for brevity, we will hereafter refer to each as the Thomson Company in discussing transactions to which either was a party. Some of the questions in this case were determined in the adjudication referred to, but not all. Important references are not the same in the two actions, and the prior uses now

Minnesota State Library, St. Paul, Minn.

alleged and specially depended upon here were not set up in
40 the other case; besides present defenses, as indicated above as (*c*), (*d*) and (*e*), are new. We have the record of the old case before us as part of this case.

The District Court in the former case (Circuit Judge Dodge sitting) found no patentability in Sarmatta. It is regretted that the opinion of the Circuit Court of Appeals reversing him is so drafted that it is not helpful in elucidating the solution which it attempts. It is little more, in fact, than a formal reversal of Judge Dodge, who analyzed the prior art in finding anticipation. The Circuit Court of Appeals does not attempt to meet the reasoning of the District Court. Giving the opinion, however, all due respect, we still feel at liberty, in light of our larger and different record, to review the questions which the court in the First Circuit has decided.

The application of Harmatta had many vicissitudes. It was filed December 3, 1903, and granted December 3, 1912. The specifications, as they finally appeared, are so different from those offered at the outset that it is a matter of close analysis to trace their genealogy to the latter. Eight times was the application rejected after original and amendments were under scrutiny of three different examiners. The allowing examiner (the fourth one in charge) finally passed the case, as it then stood, to an allowance with evident reluctance, venturing the opinion that certain citations anticipated many of the claims. He (Examiner Rich) concludes in his allowance as follows:

"Inasmuch as the claims of this case have previously been considered allowable and those noted above have been contested in an interference with a patent wherein similar claims were granted, a formal rejection is not now made, since upon consideration and explanation it may appear that the references cited have been formally or informally considered in the examining division earlier having jurisdiction of the applications and held not pertinent. It is thought best, however, to note them in order that if the claims do differ from the patents, such differentiation may appear in the record."

41 February 9, 1909, the third examiner (Shaw), after the eighth rejection of the application, made this suggestion:

"It is thought that if there is any patentable matter in this case it resides in the securing of the sheet metal parts together by means of the small round, sharply defined place of welding which answers the purpose of a rivet, as is set forth on page 6 of the original specification."

The original specification was cancelled May 9, 1904, and the specification and claims had been repeatedly amended and twice entirely re-written before 1909, each time excluding that in the original which Examiner Shaw qualifiedly approved. At no time prior to the latter's suggestion, not even in the original specification, was any claim made for patentability upon this specific idea, but January 27, 1910, more than eleven months after the hint came from the examiner, two claims, attempting to specifically cover it, were offered by way of amendment. They were rejected March 22, 1910, by Examiner Shaw. In the meantime the Rietzel patent

(928,701) had been allowed. The examiner suggested that, in accordance with Rule 96 of the Patent Office, applicant adopt Rietzell's claims for the purpose of interference, directing attention to the rule that unless that were done, the application would be finally rejected as covering nothing new. Harmatta's counsel followed the suggestion, taking altogether eleven claims from Rietzel, and interference proceedings were begun with a declaration dated April 26, 1910.

Final allowance to the Thomson Company, as assignee of Harmatta, resulted after the close of the interference in 1912, but under circumstances which not only take away most of the force of the presumption of invention and patentability which otherwise would follow allowance, but give opportunity to reflections upon the good faith of plaintiff itself in its dealings with the Patent Office. We discuss this matter at length hereafter. We thimk the presumption in question gets all the honor due it in this case if we do no more than to keep in mind that it exists.

Something analogous in suggestive flavor attends the situation which finally developed in and from the litigation in Boston
42 which adjudicated for the First Circuit. The record shows that counsel for defense in that case prepared their work ably in their briefs against the validity of the patent. They are exhaustive and persuasive, but the presentation was lamentably lacking in the offering of known facts. Thus, while the McBerty alleged prior use, which figures so largely and importantly in this case, was known, it was neither pleaded nor vigorously offered. Likewise the Rietzel matter was ignored, although the losing counsel had also lately defended another client in a suit by the Thomson Company brought on the Rietzel patent. Even if it be a fact that our views respecting the effect of the McBerty and Rietzel matters are in each instance unsound, it must be admitted that each is at least so significant in scope and application as to justify and very loudly suggest offering it to the court in a vigorous defense to a patent in which it is in seeming collision. After the adjudication in the case in Boston terminated, the successful litigant bought out its rival and gave the latter's responsible head, who, under his counsel, managed the defense, a most advantageous connection with the exploitation of the Harmatta process. This court does not permit itself to adjudge, to any extent, anything sinister in these matters, but, because of them, we not only find special occasion for regret that Judge Putnam did not write an opinion in reversing Judge Dodge's conclusions which met the latter's reasoning in some detail at least, but there is an additional strong call for extreme care in this court, although the importance of the issue is itself so great as to demand our very best attention.

Passing upon the defenses, we may discuss together those designated above as (*a*) and (*d*) dealing with patentability in 1903 because of the then state of the art and prior uses. The file wrapper indicates a very unanimous opinion by the patent office examiners that Harmatta was treading a path barely, if at all, distinguishable

from that marked out in the art, and their individual and independent judgments, as the case passed the years of its pendency by, seem confirmed by acquiescences in the repeated rejections. The record justifies Judge Dodge's observations (227 Fed. 428, 432) "that only with unusual difficulty was Harmatta able to suggest, or the Patent Office to find, in his spot-welding process, how-
43 ever described, anything capable of being regarded as patentably new in view of the prior art."

After careful consideration of the record, giving full respect to the unanalytical opinion of the Court of Appeals of the First Circuit in the Barney & Berry case, the mind of this court concurs with that of Judge Dodge that the disclosures of the prior art were so illuminating that patentability did not rest in the Harmatta process even as it was developed by the aid of Examiner Shaw after it had been in the office for more than six years. In our judgment, a question, the solution of which determines the issues here, abides in this record of greater scope than that of mere patentability of this process, but that counsel may know the trend of this court's thought respecting them, we will consider as briefly as possible the matters of patentability and invention. Counsel for plaintiff state the alleged novelty and advantage of the invention in these words:

"Harmatta for the first time in the art devised an electric welding process having the following characteristics and novel principles of operation:

(1) The current is concentrated solely by the electrodes, and not by the articles being welded;

(2) The metal, heated for welding, is entirely surrounded by comparatively cold metal;

(3) The area of the weld is determined by the size of the ends of the electrodes, and not by the extent of the overlap of the articles being welded;

(4) There is and can be no extruded metal and

(5) The parts are united in situ, as they are not caused to approach one another bodily during the process."

In our judgment, particular idea 1, as counsel designates it, is clearly exhibited in the Thomson patent No. 444,928 (where Judge Dodge found it also), in Lemp 553,923, as well as in Thomson's 496,019, which, although called for electric soldering, is evidently important here for its disclosure effect, as the Patent Office itself recognized. All three of these patents, since their inception as applications, have been owned by plaintiff. The specification in Thomson's 444,928 states that,

"the frames F F', being of conducting material, may be connected with any suitable source of electric current of large volume
44 through cables C C', or by other means, so that an electric current may be caused to pass from one roll to the other, and through any pieces of conducting material held between them in pressure-contact."

It is obvious that this current is concentrated and applied from the faces of the rolls R R' held in the frames F F'. We think that

counsel for defendant in this case were fully justified in saying that the purpose of the invention of this patent is "to unite plane sheets of metal, face to face, by pressure and an electric welding current applied to the sheets to be united, the pressure being applied to the work through the electrodes that feed the current to the work, and the welds being formed between the contacting faces of the work at the point of pressure, only." Lemp so understood this Thomson invention as evidenced by that language of his specification which speaks of the prior art, and he adopts the same device where he wishes to employ pressure at the time the current is applied, for he says that he uses rolls as terminals when he wishes to apply the welding or forming pressure in connection with the current. See lines 64 to 69, page 2, Lemp 553,923, describing the operation of the device indicated by Fig. 3. In Thomson's electric soldering patent No. 496,019, the "pressure pieces" C C' of Fig. 6 perform the same office. Burton says in his specification to his patent No. 647,694:

"In the use of this apparatus the pieces to be lapwelded are adjusted or placed with their ends overlapping on the bed-electrode 100. Then the foot-lever is depressed, and one of the electrodes of the electrode-head is brought into contact with the work, whereby the circuit is closed and the current passes through the work in transverse direction across the overlapping ends of the parts to be heated."

Of course lap-welding is a form of flat welding Any plates that can be lap-welded may be generally flat welded by adaptation of the jaws holding the electrodes to permit the insertion, to a necessary degree, of the metal to be worked upon, that is to say, it is a mere matter of slipping the two sheets to be united further along over their flat surfaces then is necessary for mere lap-welding. Harmatta's device, for instance, is suitable either for lap-welding, or for work more extended within the limits of the boundaries of the pieces worked upon, and the converse is true with mere lap-welding machines if the jaws are sufficiently modified to meet the demands of the work. Harmatta's original specification was for lap-welding. In his concluding paragraph therein is this suggestion by way of illustrating what he is working upon: "If then two superposed sheet metal ends to be welded together are introduced, etc." In Parkinson (English, 1894, No. 14,536) by Fig. 3, and in Bernados (German, 1890, No. 50,909) by Fig. 2, devices having the same function are shown. In the American translation in evidence, Bernados says:

"This process may serve to directly weld together relatively thin metal sheets and rods, of one and the same or of different metals; * * * This process is clearly distinguished, both from the point of view of the inventive idea on which it is based and from that of its mode of operation, from * * * the electric welding process of Elihu Thomson."

The idea is, we think, also very plainly in the Perry patent, No. 670,808. Other references are in evidence which defendant's counsel in-

sist have a bearing here. Some of them will be discussed later in another connection. Enough, we think, is offered above to indicate lack of novelty in this first characteristic.

Going now to particular 2, that "the metal heated for welding is entirely surrounded by comparative cold metal," leaving a condition of "spot" welding, what do we find? Obviously, that the result is determined by the shape and character of the application of the current-concentrating electrodes. If these are roller forms and applied by rolling as in Thomson No. 444,928, and in Lemp and in Harmatta's discarded roller specification, the welded strips would be bounded on the sides only by comparatively cold metal. If roller electrodes are applied with either intermittent pressure or intermittent current, or if pin electrodes are used, of course there will be an entire surrounding of the weld by cold metal. Indeed, the idea that spot-welding may be done with roller electrodes is present in both the Thomson 444,928 and the original Harmatta specifications. In the former, after directing that the plates, being between the rolls, should
46 be squeezed together to form an electric contact, is said (p. 1, lines 88, et seq.):

"The electric current being now turned on as it passes from one roller to the other and across the point of pressure will heat the work to the welding temperature and soften the same slightly, after which the screw may be given a few more turns to effect a solid union. The work, having been thus started, may now be moved along through or between the rollers so as to bring successive parts of the joint into position to be pressed and heated in the same operation."

Harmatta says (file wrapper, p. 3, 2nd paragraph):

"The pressure being exerted by roller electrodes, whereby the advancing series of single points * * * is united to a whole, etc."

In Thomson 496,019, undoubtedly the result effected in plate P, at least, of Figs. 4, 5 and 6 is to leave surrounding the welded portion an area of cold metal. Also it seems clear that the flanges of the part (to be welded) designated as P′ would be only incidentally and slightly heated in the process, merely because of their adjacence to the "pressure piece" C′. In Thomson's riveting patent 396,015, the same thing is shown. There the so-called plunger and anvil, G and E′, really are the termini of electrodes, performing upon the material of the plates to be riveted, after the particular rivet is swaged and set, the same function, except in annular result rather than as a filled spot, which they obviously would accomplish if the applicable ends of each were flat and not concave and were used in plain spot-welding. Thomson says that if the current is allowed to pass under pressure longer than is merely necessary to swage and set the rivet, "the application of pressure to the pieces to be riveted will weld them together around the rivet." Plainly this would be the work of whatever circumferential surface there is to the concave-faced electrodes and just as manifestly these riveted places, surrounded by a ring of welding, would be further surrounded by areas of cold metal. When we contemplate the unequivocal form of this statement, and know that the

result which it plainly suggests, will follow, it is to be marveled at that Thomson, in endeavoring to assist the Thomson Company
47 to obtain a patent on Rietzel's application and in speaking of this patent of his (No. 396,015) should say that (see file wrapper, Rietzel No. 928,701),

"the only possible welding that could be produced by that process would be possibly some sticking of the edge of the perforation in the metal sheet to the side of the rivet which is a mere incident of the invention and there is no welding of the superposed plane surfaces or opposed faces of the plates to one another by welds disposed over such plane faces."

Notwithstanding this statement from such eminent authority, it seems to us that we are clearly given to know that there would result from the process of Thomson 396,015 an annular welding together of the plane surfaces of the riveted plates beyond the rivet, the breadth of the welded surface within the circumference to be determined by the amount of annular plane surface on the faces of the electrodes which are concave at their centers. Besides, it seems that a deduction from the roller method is obvious that the question whether the weld shall be partially or wholly surrounded by cold metal depends either on the shape of the electrodes or on the size of the flat surfaces to be welded, or on the extent or manner in which the electrodes are applied to the face of the material to be worked on. For instance, if roller electrodes are first applied within the boundaries of the plates and stopped before any edge is reached, the result would be an elongated spot weld. So also would be the result if the plates operated upon in Thomson's 444,928 had dimensions greater than the working face of his segment electrodes (Fig. 2). It is obvious, as noted above, that if roller or segment electrodes are simply applied to the plates with current and pressure, but not rolled, a spot weld would result. The importance in Harmatta's field of the Kleinschmidt patent (No. 616,436) issued in 1898, was recognized by him in his final specification in which is disclaimed any feature disclosed by the Kleinschmidt grant. Whatever else may be said of the latter, it can not be doubted that its welds are surrounded by areas of cold metal. Harmatta himself seems not to have considered, in his original application, the advantage of this particular (2) as an element of his invention. What he then thought he was inventing was, to
48 use his language, a process which consisted,

"In one of the electrodes (or both of them) not only serving to feed the current, but also being employed for exercising a more or less strong pressure either before and during the period of supplying the electric current, or only at the moment of this supply, at the place at which the welding is to be done. The member which feeds the electricity is thus at the same time the tool, and in this manner the most favorable conditions of working possible are secured, since, as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough."

His only process claim in the originall application was in this language:

"1. The process of electric welding, consisting in employing the electrodes not only to conduct the current to the objects being welded, but also to exert a regulable pressure on the same, substantially as described."

His remaining three were for apparatus. He treated spot or intermittent welding as if it were obviously, as it seems to us it is, but a variety of result, depending upon the choice of the operator. He illustrates two forms of apparatus for its accomplishment and speaking of one of them says:

"Thus, if it is required to weld, for instance, sheets of metal only at particular places, the apparatus shown in Fig. 5 may be advantageously employed, the electrodes *a*, *b*, having the form of pins. * * * If then two superposed sheet metal ends to be welded together are introduced between the electrodes, and the latter then firmly pressed together and the circuit closed, a small round, very sharply defined place of welding is caused which perfectly answers the purposes of a rivet."

All this part of his specification he omitted in seven successive amendments and modifications, until January 27, 1910, more than six years after his filing date, his counsel observes the hint of an
49 examiner made eleven months before, and, then, for the first time, claimed this feature as the essence of his invention.

Should a patent have been allowed Harmatta on the original application, it cannot be said that he would have been protected against spot-welding accomplished by any method not covered by his apparatus claims and without the limits of his process claims. Gate Lock Company vs. Greenleaf, 117 U. S. 554, 559.

It is plain that Harmatta applied in the first instance in ignorance of the state of the art. The original specification contains the clause quoted below and upon the erroneous conception, therein indicated, that the field was wide open, he predicated his alleged invention.

"According to none of the present known electric welding processes are the articles to be welded firmly pressed together during the welding operation by one or both electrodes, for the purpose of favoring welding. Hitherto either no pressure has been exerted at all, or it has been exercised at a certain distance from the place of welding, or at all events not centrally direct upon the electrodes pressing on the place to be heated. In short, hitherto direct electric welding pressure has never been exercised, by means of the electrodes located in the direction of the current directly above the surface or point being welded."

It took nearly seven years of experience in the Patent Office and the enlightenment of eight rejections to finally convince him and his counsel that, at the best, a most restricted opportunity of invention was before him.

Judge Dodge finds that the only possibility of invention lay in making welds small in area, isolated in comparatively large areas of unwelded surface. Speaking of this he uses language which we would adopt:

"It is difficult to regard the above as an inventive idea. Referring again to the Thomson patent, No. 444,928, the process therein described, while it is said to be 'especially applicable to the welding of plates together at their edges, instead of riveting,' is just as applicable to the welding of plates or sheets at other places within their area as at their edges. The roller electrodes employed, when brought together on each side of the work, and until some-
50 thing more is done, will pass the electric current and make the weld at the spot or point of pressure and nowhere else." (See claim 1 of the patent referred to). "If, having there made the weld, they should be again separated, instead of having the work fed between them while their pressure upon it continued, they would leave an isolated spot weld joining the plates and be in readiness to make another weld isolated from the first by any desired area of unwelded surface."

We are unable to appreciate the distinguishing significance of particular 3, "that the area of the weld is determined by the size of the ends of the electrode and not by the extent of the overlap of the articles being welded." The very same conclusion, we think, is demanded from a consideration of the process and apparatuses disclosed in the patents already referred to. Thus, if in the overlapping offers room enough, the area of the resulting weld depends upon the form of the applied surface of the electrodes whether roller, pin or otherwise. It is only a matter of slipping the plates to be joined far enough over each other.

Nor are we able to agree with counsel's conclusion in particular 4, that there is and can be no extruded metal. Whether or not some metal, softened by the heat, through applying the method in question, will pass beyond the boundaries marked by the electrode faces depends, not upon the method, but upon the skill and care of the operator in controlling the heat and pressure. That seems to be the clear effect of both testimony and example before us, and, without proof, it seems to be an entirely obvious deduction. In demonstrating for us the process in suit upon one of plaintiff's improved machines, plaintiff's expert Gravell burned a hole through the plates to be welded. He employed an excess of both current and pressure. Had he used less pressure, it is to this court unimaginable that some of the over-softened metal of the plates would not have escaped beyond the peripheries of the points. Too much pressure, too much heat, either or both, it seems, must bring about extrusion. If the point to be welded is well within the limits of both plates, the related pressure outside of the heated area may confine extrusion to microscopic lines. If the spot operated on is near the
51 edge of a plate extrusion will be more apparent. To say that there is no extrusion whatever is not borne out by the facts. This is actually illustrated in this case in Plaintiff's Exhibit

2 to interrogatories, showing an infringing product. In that the second weld from the top shows plainly slight extrusion and at the bottom weld the escape of some metal under the pressure is still more apparent.

Particular 5 is not exclusively an advantageous incident of the process in question. Parts are united in situ and while stationary in the process described in the patents considered above. Any movement they make is that preliminary to the welding to arrive at the welding place, and not in the immediate process. In these disclosures, as in Harmatta's process, the plates to be united are not brought together for the purpose of thus conducting the current as the contact, but are fed together to the electrodes which carry the current to them as they are in contact.

We are of the opinion, therefore, that this invention is anticipated in all senses and particulars in the prior art, a consideration of which art also suggests that there is no room to claim here for a new process which is worked out through a novel aggregation of old ideas not hitherto found in combination. None of these advantages seem to us to be new, nor is their association novel. We are pleased to note that Harmatta's attorney (when there was a real contest on the merits in the interference, that is, before the Thomson Company took both sides of that controversy) held to a view which, if good, supports our conclusions respecting the illumination of the prior art. Defending against the insistence of Rietzel's attorneys that silence in the specification as to spot-welding from the amendment of 1904 to that of 1910 amounted to an abandonment or disclaimer, Messrs. Duffy and Sons (brief) argued to the Patent Office that spot-welding was saved on the ground of mechanical equivalency, citing Hurst vs. Cassidy, 62 O. G. 1965 (43 Fed. 257). On this theory there is little question that the prior art has occupied the field except the possibility suggested by Judge Dodge (227 Fed. 431) which he concluded was non-invention, that Harmatta cannot be credited with any new idea:

> "Beyond that of making his electric welds small in area,
> 52 rather than large, in comparison with the areas of the opposed surfaces to be joined, and isolating them so as to leave each surrounded by a comparatively large area of unwelded surface."

But if the exact idea is not found in the prior art,—if the idea was new in 1903—was it so significant a variation as to call upon inventive ability to develop it? We are fully aware of the danger in retrospective analysis, and we appreciate the demand that mere narrowness of departure from previous disclosures must not be allowed to defeat a meritorious invention. We likewise understand that the personal equation on the bench embarrasses a just application of the principle that that is invention which may be seen to be something more than that a fair deduction from prior art or usages which should readily occur to one reasonably skilled in the art and reasonably intent on its application. In the judgment of this court, more mistakes, pro and con, are perpetrated by the bench in the application of this principle than any single other. So much depends upon the vision or imagination of the individual who sits in

judgment. But, after all, what does this record plainly show? First, that suggestions of more or less potency did abide in the prior art. Second, that it required a hint from an examiner, after the applicant has suffered years of reverses, to advise the latter that he may have stumbled on a patentable idea. He suffered final judgment against himself in Canada upon a duplicate of his American application before he awoke, and, what is the plain inference from his preliminary statement in the interference case, rejections in several other countries where it is the practice to carefully examine the prior art before allowance. Third, it is in evidence here that the prior art so far advised others, that they, before Harmatta's filing date, readily modified existing apparatus to do, with success, precisely what we have before us in the Harmatta patent. We are not confined to reasoning merely that the idea in question was one which one reasonably skilled in the art and intent on its application should entertain without inventive effort—we find two instances at least where, when the demand came for the practice, the idea came also. This does not happen to be an instance where the art was broadened ever so slightly by one mind to meet a great demand of progress, with no contemporaneous effort meeting
53 the situation as adequately. Nor is it a case where the substance of the invention was not followed until the method of the alleged inventor in question became well known to the effect that such a circumstance, itself, would be "pregnant evidence of its novelty, value and usefulness." Magowan vs. New York Belting & Packing Company, 141 U. S. 332. The infringing machines have a geneaology even anteceding Harmatta's in this country, and they were earlier on the general market than their rivals. So we sympathize with the reluctance of Examiner Rich in passing the application for allowance, for we do not consider that Harmatta was an inventor entitled to a patent in the instance before us. It appears to us that, considering the prior art, "the improvement described in the patent was within the mental reach of any one skilled in the art to which the patent relates, and did not require invention to devise it, but only the use of ordinary judgment and mechanical skill." Phillips vs. Detroit, 111 U. S. 604-607.

Respecting the application of the principle in question, we think the case on the facts is in the same general category and controlled by the fact conclusions of such cases as Atlantic Works vs. Brady, 107 U. S. 192; Morris vs. McMillin, 112 U. S., 244; Hollister vs. Benedict & Burnham Mfg Co., 113 U. S. 59, Hendy vs. Miners' Iron Works, 127 U. S., 370. If, for instance, Brady did not invent anything patentable (Atlantic Works vs. Brady, supra) by projecting from the stem of a dredge, extending a substantial distance below the bottom of the boat, a so-called mud fan, being a set of revolving blades somewhat similar in shape to those of a propeller but sharper on their fronts and less inclined on their faces, which, propelled by an extra engine in the bow, were to stir up a river bottom by their rapid revolutions that the sand and mud might be carried off in a current of muddy water, because it was not an uncommon practice theretofore to disturb the bottom of a channel to be dredged through the action of vessels' propellers, whether the dredge proceeded back-

wards or forwards it is difficult to see where any more dignity should be accorded to Harmatta's spot-welding idea which involved and did nothing more than apply electric current and pressure to superposed metal plates to the same effect, substantially, as if the roller electrodes of the prior art were employed for pressure and current but not revolved.

54 We have alluded above to the McBerty alleged anticipatory use. The evidence in this case is clear that from an experience McBerty once had with a butt-welder was evolved the infringing machines producing a large business which is imperiled by this litigation. There is no fair opportunity in the record to even suggest that this evolution was initiated or assisted by any knowledge of what Harmatta was doing. We are compelled to find that this was wholly an independent matter.

To make the defense of prior use, the defendant has the burden to prove, beyond a reasonable doubt, that at a date prior to December 3, 1903, the Harmatta idea was reduced to successful practice in one or more of the instances pleaded. We think the defense is made in the proof of McBerty's experience in 1901. McBerty's credibility is savagely and most skillfully attacked, but, in our judgment, not always fairly. Several instances are noted where the record is somewhat violated to make a point against his veracity. For instance, plaintiff says in its brief that the Warren catalog of 1901 offered in evidence is inconsistent with McBerty's claim that steel centers were used at that time, but the quotation from the catalog used to make the point applies only to the high-class machines described as A-fans, whereas McBerty is speaking of the cheaper fans known as G-2, which, according to other witnesses than McBerty, had pressed steel centers in 1901. There is no representation in the catalog that the G-2 fans had brass centers. In attempting to describe the much discussed Exhibit M and its relation to Exhibit P, counsel insist in the brief that,

"McBerty admits that Exhibit P was not made at the same time as Exhibit M and not until long after, because he says that the piece which has been cut from the fan of Exhibit M, and which he says appears in Exhibit P was not cut off from Exhibit M until 'quite a long while' after the fan blade of Exhibit M was welded to the spider."

But it is very plain in the record that McBerty is not talking about Exhibit P as cut from Exhibit M a long time after, but he is speaking about another piece cut from the extremity of the blade, the balance of which remains as Exhibit M.

55 There is, however, so much plain room for debate whether we should receive Exhibit M and the cut of a G-2 fan in the Warren 1901 catalog for everything that McBerty claims for them that, if McBerty were not strongly corroborated in the indispensable details of his story, we could not say that reasonable doubt whether the alleged prior use was had is eliminated from the proof. In saying this we do not mean to say that he is to be regarded as an alto-

gether unreliable witness, or that we do not believe the essentials of his story, but, even taking him as counsel for complainant picture him,—go as far as they do in discrediting him as offering to suppress evidence by sale to the Thompson Company—assume with them that Exhibit M is a recent product, bearing a false date,—reject as wholly fabricated his story that the cut of G-2 fan in the 1901 catalog was made from a photograph of one with spot-welded blades—quote to the limit his concessions of conduct in 1913 which was devoid of frankness to Howe and others—judge his value as a witness in the light of his very great interest in the outcome of this case,—still we find convincing testimony from others which not only makes evidence directly but effects complete corroboration of the essential features of McBerty's claim. It is not indispensable to the defense of prior use in the Warren factory that we should be convinced either that Exhibit M is just what McBerty says it is, or that the illustration of the G-2 fan in the 1901 catalog is from a photograph of a spot-welded fan. If true, these circumstances afford strong proof; if false, the defense is affected only through the discrediting of one witness.

We think it is proven here beyond a reasonable doubt that sometime early in 1901, whether February or later is not material, a machine was operated in the Warren Specialty & Electric Company's plant at Warren, Ohio, adapted by McBerty from a butt-welder, which successfully spot-welded a small quantity of fan blades and that these, in assembled form, went into distribution in trade. No one is here to dispute by any direct testimony that Exhibit B (McBerty's alleged welder) did not do in 1901 in the Warren factory what the court saw it do in the progress of this hearing, and there are many unimpeachable witnesses who identify it and speak for it and as to what it did then. That what is successfully ex-
56 ploited then was the Harmatta process there is no room for question. Of course witness Lipps is weakened by his mistake as to the year he worked in Warren, and we must not overlook Captain William E. Smith's relation to the case, but no other witness is subject to any reasonable discrediting suggestions. Major Crafts, Powers, Gilder and McDonald are convincing witnesses, so are others to minor matters. This court believes them, and, believing them, we find some additional evidence in the McBerty and Lipps testimony, and very much in that given by Capt. Smith. Indeed, there is no good reason at all in discrediting the last as a witness in any degree, for his connection with this case is in no wise inconsistent with an entirely fair position as a witness, and he offers nothing that is not entirely creditable. Five highly credible witnesses not only identified Exhibit B as the machine they saw in 1901, each of them having an individual and appealing reason for identification, but they fix the general date beyond question by reference to contemporaneous matters of both public and private interest. Some of them saw it successfully spot-weld, and all of them saw its product as worthy of and in the process of entrance into commercial channels. To say that these witnesses are not telling the truth is to say substan-

tially that they are deliberately perjuring themselves, for their testimony is so individualistic that there is no fair chance to say that it is the product of a stimulated retrospective imagination induced by interest or friendship or for some other reason not highly discreditable. When McDonald, for instance, says that not only did he see McBerty weld a complete fan in 1901 but that he, in 1901, used a spot-welded fan as a test fan in the performance of his own duty as the final inspector of completed devices, and, with it, as the criterion, tested and passed to the packers the product of that grade to go into the market, some of which had spot-welded blades, he is either reciting an important fact or is perpetrating a deliberate fabrication. We may make the same observation of the essentials of the testimony of Major Craft, Capt. Smith, Gilder and Powers. Taylor's testimony also has some corroborative value because of his statement that in 1903, in the Peerless works, he saw Exhibit B, which he identifies, and used it to make spot-welds. In addition, the plaintiff
57 itself introduced the affidavit of Frank G. Brown (deceased), given to Mr. Howe in 1913. Brown fixes the date of a Sunday visit to the Warren factory as prior to May 6, 1901, by reference to other transactions. There he saw Exhibit B and some spot-welded fan blades, but, there being no current on Sunday, he did not see a spot-welding operation. Subsequently, in the Peerless factory, he saw the same machine in use for both butt and spot-welding. The testimony of Ensor has some importance as corroboration. Of him also must it be said that he must have told the truth as to the essential feature of his testimony or he deliberately fabricated it. If he saw in 1910 or 1911 in the scrap room of the Peerless factory a completed fan having spot-welded blades, the fact is important. From what we are permitted to know in this record of the sleuthing activities and disposition of the man Newton A. Smith, an agent of the plaintiff, who was present in the court room but who did not deny the somewhat discreditable reflections upon him given by witnesses for the defense, little surprise is called for by the fact that subsequent to his visit to the Peerless factory this fan seen by Ensor could not be found. Some inconsistencies, discrepancies and omissions do, in fact, appear in the affidavits Mr. Howe took in 1913 from some of the witnesses spoken of above, but such situations are usual and are the well recognized weaknesses of affidavit testimony. It is usually not the composition and *b*erbiage of the affiant, and it generally suffers in substance because another mind intervenes, with interpreting and diluting effect, between the witness and the auditor of his testimony. Aside from this, plaintiff meets this evidence with testimony, largely negative in character, which is, if disputatious at all, only inferentially and feebly so.

It cannot be said that the work at Warren was a mere experiment afterwards abandoned. The fact that witnesses speak of the incident as an experiment is not proof. Whether it was such is a mixed question of law and fact, to be determined from all the evidence and not by the loose terminology of lay witnesses. The force of the testimony is that the trial was successful, and that its product got into commercial channels. Not only was there no abandonment, as that

word is used in this connection, to be interpreted by the nature
58 of the work as merely experimental, but a few years later *Captain Smith constructed a successful spot-welding machine* for the Carnegie Company as a result of his knowledge of what Exhibit B would do, gained in 1901, and Taylor, aided by his knowledge of Exhibit B, designed for the Winfield Company a line of spot-welding machines which came into general use before the devices emanating from Harmatta were generally known in this country. The contest here is actually against alleged infringing processes performed on machines lineally descending from McBerty's apparatus of 1901.

It is urged upon us by the plaintiff that the case on the facts and as to prior uses is within the authority of a number of decisions, the principal and most authoritative being the Corn planter patent, 23 Wallace, 181; Smith vs. Goodyear Dental Vulcanite Company, 93 U. S. 486; the Barbed Wire patent, 143 U. S. 275; Deering vs. International Harvester Works, 155 U. S. 286.

The question is one of the force of the evidence as affected by the quantum and character of the testimony and the possibility of coloration through lapse of time or interest as well as the credibility of witnesses. The cases cited establish the salutary principle contended for by the plaintiff, but the question in each recurring case is whether its particular evidence meets the requirement. Compared with the character of the testimony in this case, the Goodyear case, on the facts, loses any precedent value; there is a wide disparity in evidential force. The same may be said of the facts in the Deering-Harvester case. There every one of the witnesses was under some sort of discredit; and the situation on the fact record is incomparable with what we have before us. Of the Supreme Court decisions (and we are discussing only them because they control the lower courts relied upon by plaintiff), the facts in the Corn Planter Patent (23 Wallace, 181) and the Barbed Wire Patent (143 U. S. 275) most nearly approach, in character and force of the evidence derived from them, the record we have here, but neither of them present established facts of the cogency of those of the record before us.

In the Corn Planter case the decision points out how the alleged prior uses in fact departed in substantial practices from the functions
of the invention under attack. In the Barbed Wire case the
59 facts were under special and direct dispute and there were elements of some improbability respecting the actual existence of a pertinent use. In the case of Warren Bros. vs. City of Owosso, 166 Fed. 309, a decision by our own Circuit Court of Appeals and cited by plaintiff, the court not only found definite abandonment, but that the use itself, in its very essence, was experimental. We think these cases and the other cases cited are clearly distinguishable on the facts from the case at bar, respecting the force of proof of prior use.

The case of Lipps is a good example of the wisdom of the rule that proof should exclude reasonable doubt. There is nothing in the record to discredit him for integrity. He has no interest in the case. That he came on the stand and tried to be truthful there is no ques-

tion, but he was mistaken respecting one very important identifying feature, hence, uncorroborated, he, like McBerty, lost much weight. But witnesses, in whose testimonies are weaknesses which disable them from substantially assisting a clear conclusion, when they are considered by themselves, or with other witnesses whose credibility is also weakened, may be so corroborated by the unembarrassed and impregnable testimony of others, that, as to the indispensable details, they again may be heard with a large degree of favor. That is just what has happened here. If all of defendant's witnesses were open to the attacks which were more or less successful in the cases of Lipps and McBerty, the authorities just considered, and others from the lower courts argued to us, might be allowed to control our judgment respecting the conclusiveness of the proof. But the situation is vastly different. On the controlling matter to which these two men speak—did McBerty, in 1901, on Exhibit B, successfully spot-weld, to their spiders, a quantity of fan blades, whether six or two dozen is immaterial, which fan blades were assembled to their motors, and the fans, so manufactured, placed in the completed stock of the Warren Company, to go into the market? On this proposition there are five witnes-es directly, and one or two more of indirect value, no one of whom is impeached and they corroborate these weak witnesses. Lipps and McBerty, then, do, in fact, contribute very much that is credible to the court's information.

60 This case, therefore, appeals to us to fall within that category of cases represented by Supreme Court decisions such as Coffin vs. Ogden, 18 Wall., 120; Egbert vs. Lippman, 104 U. S. 333; Brush vs. Condit, 132 U. S. 39, and to be a stronger case on the facts to carry the burden peculiar to a defense of this sort than even Coffin vs. Ogden, supra.

If we did not have here Exhibit B so clearly identified as well as the character of its early operation and product, there would be more force to the cases cited by the plaintiff. Exhibit B is a continuing concretion, a piece of evidence the existence of which does not depend, as in the alleged anticipating devices in the cases in question, upon oral testimony. It is to be noted how much more effective is Exhibit B in this case to support the defense than were the alleged Drawbaugh devices in the Telephone cases, 126 U. S., 1, 566. Much of Exhibit B, just as it was in 1901, is before us and its present reconstruction as it was then is well established by those, besides McBerty, who had every reason to know all its details as they were then. That it will successfully spot-weld was demonstrated. So Exhibit B appeals to us as established as a concrete, visible, contemporaneous and most important matter of "proof which tells its own story." The reason for the rule demanding conclusive proof of prior use is the ease with which such proof may be fabricated or colored, either corruptly or generally, through the effect of interest or friendship stimulating a memory to confuse fact with imagination. We have seen the witnesses as they spoke on the stand. The naturalness of their stories suggests want of co-operation. They corroborate each other in the varying scopes of their experiences with Exhibit B. Their testimonies are to such important things that, if unreliable in substance,

there is no escape but to assign wilful perjury as the cause by a number of men whose credibility is not subject to attack from anything that appeared before us. The testimony of Smith, Crafts, Powers, Gilder, McDonald, Taylor and Ensor, and Brown (by affidavit) is all perjured—every one of these men, as well as Lipps and McBerty, is foresworn, if this allegation of prior use is substantially untrue. Perjury is unthinkable with such men as these men appear to be. Besides, their stories have in them no element of the unusual or
61 unexpected. What they say McBerty did in 1901 is just what we can see one interested in the matter might readily do in due course of satisfying his interest. The incident was a logical step, plainly indicated in the condition of the prior art. Rietzel's experience is an independent parallel.

The defense designated by (*c*) above, that the subject matter of the grant was never entered under cover of the inventor's oath, is new to this case. If, however, the decision of the Barney & Berry case (227 Fed. 428) should be regarded as decisive, it would fail because it is based upon the theory that, while the case was pending in the Patent Office, there was a substantial departure from the original specification and claims, and the final grant was for something not in the case at all, as Harmatta's invention, until January 27, 1910. In the Barney & Berry case, the ninth defense was that Harmatta's original application did not disclose the method of the final grant and that while the application was pending it "was unlawfully broadened with intent to cover the successful method and article of the defendant and others." Although the Circuit Court of Appeals of the First Circuit said that this defense was specially urged to it, again, as to it, the decision is aggravatingly uncertain, and we are left to conjecture very largely to determine just what was the thought of the court respecting this matter, although the inference is impelling that judgment on this defense is against the defendant. If the court reaches that conclusion, however, on the basis of facts as it attempted to recite them, we are privileged to give the decision only perfunctory consideration. What is said about the matter is indefinitely confined to but a few lines in which occurs this statement, to which we cannot agree:

"The patent was applied for on December 3, 1903, and was not issued until December 3, 1912; but the claim for spot welding was always in the application."

As already indicated by us, we are unable to find any claim for spot-welding, as such, before the amendment made in 1910, following the hint of Examiner Shaw, given more than eleven months before. Certainly there is no direct claim for spot-welding in the original application. Everything that even indefinitely touched upon it was taken therefrom in 1904 and was not put back for
62 nearly six years. This condition of the record was the subject of elaborate argument by counsel for Rietzel in the interference proceedings between the Rietzel grant and the Harmatta application. In support of a motion to dissolve, upon the ground, for instance, among others, that Harmatta had no right to predicate the

article claims in interference because there was no supplemental oath attached to his amendment of 1910 to support them, counsel for Rietzel in behalf of the Thomson Company, before the Examiner and before the Commissioner, on appeal, produced arguments which seem to us conclude the proposition in their favor. It is interesting to note that in the interference proceedings, the question raised and so ably argued was not decided, the holding in each instance being that it was not to be heard on interference—that it was purely an ex parte matter.

While the defense is broadly stated in this case, it is, in argument, raised specially to the article claims, 16 to 21, inclusive, which were taken bodily from Rietzel and were never, prior to 1910, claims in any form in the Harmatta application. The question is not argued at all by counsel for plaintiff in this case. Whatever may be said respecting the abandonment or disclaimer of whatever disclosure there was in Harmatta's original application of spot-welding, as very persuasively argued at one time in the proceedings by counsel for the Thomson Company, it is true that there was no hint of a demand for article claims until 1910. It seems to us inevitable that under the decision in Steward vs. American Lava Co., 215 U. S. 161, affirming our own Circuit Court of Appeals, these claims (16 to 21) must fall, and that a decree in that respect, at least, should run against plaintiff. See also Yale Lock Co. vs. Greenleaf, 117 U. S. 554, 559.

We prefer to discuss the alleged Rietzel prior use in connection with a defense which is peculiar here, which is, in our judgment, the most important because it not only effects the interests of the parties immediate to this case, but it raises a question of great public concern when we consider what the public relation to a patent grant is. While the defense is ostensibly but incidental estoppel, although as to an important matter, in effect it goes much farther because there is measurably involved in it the very integrity of the principle of patent monopoly. Judge Baker, in Rail-
63 road Supply Co. vs. Hart Steel Co., 222 Fed. 261, 274, explaining the reason why a presumption of validity of the grant should be indulged and why priority of use must be established beyond a reasonable doubt, called attention to the fact that a patent is a "contract between the government on behalf of the people and the patentee," and that it is the fruit of an examination "on behalf of all the people" by public experts. Clearly the function of the Commissioner of Patents is to shield the public from the imposition of an unjustified monoply. One is given a patent monoply for seventeen years as a premium for a real contribution to science and useful arts. As Chief Justice Marshall said in Grant vs. Raymond, 6 Peters, 242:

"It is the reward stipulated for the advantages derived by the public for the exertions of the individual, and is intended as a stimulus to those exertions."

No one is entitled to this reward unless he produces some cogent proof that this contribution has first been made by him or in his behalf. His proof must be to those appointed to safeguard the public

against an improvident grant. He is protected by a presumption of the validity of his grant and he cannot be allowed to obstruct, directly or indirectly, that intelligent and full examination which, only, secures provident action by the public's representatives. The time within which he may enjoy the fruit of an invention by way of monoply is strictly limited by the power of Congress. Defendant claims that the conduct of the Thomson Company in the obtaining of the patent to Rietzel and also perpetrated in the Rietzel-Harmatta interference proceedings estops it from asserting priority of Harmatta over Rietzel, and from questioning a prior use by Rietzel which would invalidate the grant sued on. If that contention is good, plaintiff's case must fall. What are the facts? February 25, 1905, Rietzel, then superintendent and general manager for the Thomson Company, applied for a patent, assigning to his employer. The original specification stated that it was for "a method of forming an electric welding union between the plane surface of a piece of metal and another piece of metal and is especially useful in uniting two plates or sheets of metal at their plane surfaces." One claim (No. 8) was broad enough to cover the alleged invention of Harmatta.

64 In June, 1908, while the application was on an appeal to the Board of Examiners in chief, from a rejection by the primary examiner, the latter found an anticipating reference in Harmatta's English patent, No. 22,981, of 1903, granted August 25, 1904, upon the filing of a complete specification July 25, 1904. Thereupon the case was remanded upon the insistence of the Thomson Company's counsel that they desired to be heard before the primary examiner upon the reference. An amendment was then filed in the form of a complete new specification with an enlarged list of claims (23 in number), manifestly drawn to meet every conceivable phase of the Harmatta disclosure. In support of the amendment Rietzel's affidavit of October 23, 1908, was filed to the effect that he successfully practiced the invention in the application as amended sometime in June, 1904. His practice was described in detail. In December, 1908, his claims were rejected, particularly upon certain French patents to one Egel who was Harmatta's assignee in France. These patents were published February 18, 1904. The Harmatta patents in England and France (one of those to Egel) made the same disclosures as Harmatta's original specification in this country. Thereupon to met the examiner's rejection, the Thomson Company filed Rietzel's affidavit of February 18, 1909, to the effect.,

"That prior to the 18th day of February, 1904, he repeatedly, successfully practiced the method of fastening two sheets of metal together face to face by welding them at spots in their meeting surfaces by confining the heating electric current passed from one plate to the other in such spots and localizing the welding pressure at said spots as claimed broadly in said application."

The affidavit further stated that he successfully worked at the plates at the factory of the Thomson Company, and, in further detail, described the character of the practice, relating it undoubtedly to the alleged Harmatta invention. Through the assistance of these affi-

davits, allowance of the application was obtained, and the patent issued July 20, 1909, under the number 928,701, with fifteen process claims and five article claims. The pending Harmatta application (filed December 3, 1903) was unnoticed.

65 We have already noted that the Harmatta application was enriched in 1910 by the adoption of a number of the claims from the Rietzel grant as the basis for interference proceedings. To succeed in this interference, it was necessary for Rietzel, who was the junior party, to file a preliminary statement to which his evidence should be addressed. This must claim a successful use antecedent to Harmatta's filing date, December 3, 1903. Therefore, June 14, 1910, Rietzel, produced by the Thomson Company, gave a verified preliminary statement to the effect that he conceived the invention set forth in the declaration of interference in 1897 and that, as nearly as he could fix the date, it was successfully reduced to practice in July, 1898, then being first explained and disclosed to others, and that the invention had been put to a very extensive use in the manufacture of metal work of various kinds. Thereafter the interference proceedings, declared April 26, 1910, progressed very slowly with several appeals prosecuted by the Thomson Company from the examiner to the Commissioner upon a variety of questions raised in the interest of the Rietzel patent. Numerous stipulations for extensions of time to introduce testimony, often at the manifest application of counsel for the Thomson Company, assisted to prolong the controversy. February 9, 1912, it was shown that Rietzel was in Europe, whereupon a further extension of time was obtained so that Rietzel's testimony in chief was not to close until March 11, 1912. By this time the patience of the examiner of interferences was becoming somewhat weakened, wherefore an order was entered.

"That no further extension of Rietzel's time to take testimony in chief will be granted without a verified showing of reasons why the testimony was not taken within the time hereinabove allowed."

A month later (March 9, 1912), after the entry of this order, and only two days before Rietzel's time was to expire, a stipulation was filed extending the time for taking the testimony for sixty days, supported by the affidavit of Charles F. Tischner, a member of the firm of counsel representing the Thomson Company defending the Rietzel patent, to the effect that for more than six months negotiations had been pending for settlement of the interference between the parties and that the affiant, who had had the case in his personal

66 charge, for nearly three months immediately prior to the date of the affidavit (March 9, 1912), had been traveling to and from Germany where he was negotiating for the purchase of the Harmatta invention in behalf of the Thomson Company; that the papers transferring the Harmatta application to the Thomson Company had been executed and were in transit, to arrive in a short time. The affidavit further stated, in face of the admission that the owner of the Rietzel patent had practically acquired the Harmatta interest, that

"it is desired to take testimony in the interference on behalf of the party Rietzel; that it is expected that such testimony can and will be taken and completed within the sixty days' extension of time now requested, and that the request is made in good faith and not for the purpose of delay."

How can it be said that the statements just quoted from Tischner's affidavit are true, and the promise therein offered in good faith? Later we deal with the contract betwe-n the Silesia Company and the Welding (Thomson) Company. It is there shown that at the very time Tischner made this affidavit he, himself had closed a negotiation which made the statements of the affidavit impossible. Nevertheless, it served as a pulmotor for the Rietzel grant for the time being, for it caused to be approved a stipulation further extending time (to May 11) to take testimony and undoubtedly was efficacious to effect still another delay to July 12. Later we note how it saved time to begin another suit on the Rietzel patent. When July 12 arrived, Rietzel, of course, was in default. The attorneys for the Thomson Company who had in charge the company's Harmatta interests demanded a hearing on a motion for judgment by default on July 23. On July 24 the Thomson Company's Rietzel side of the simulated controversy was granted two weeks to show good and sufficient cause why default judgment should not be rendered. Not answering this notice, on August 7 priority of invention of the subject-matter in issue was awarded to Harmatta, the senior party, with a limitation of appeal to August 27. There being no appeal, the Harmatta patent issued in due course as of the date December 3, 1912. The record shows that nothing substantial, if anything, stayed the granting of the Harmatta application early in 1910 except the filing of Rietzel's statement in the interference under
67 date of June 14, that he had anticipated by successful use Harmatta's filing date by a period of five years and a half, the use being followed by a successful reduction to practice in many ways. The delay occasioned by this affidavit was extended well into 1912 by that of Tischner.

The evidence before us shows that Harmatta executed an assignment of his application to the Thomson Company in Berlin February 3, 1912, undoubtedly while Tischner was there. There is in evidence also a contract executed in Berlin between the Thomson Company and the Silesia Company, the then owner of the Harmatta application. The date (April 3, 1912) to this contract (we have only a copy) must be an error, probably for February 3, for we find Tischner, who signed it in Berlin for the Thomson Company, swearing, on March 9 and in Washington, that it already had been executed. Harmatta's assignment to the Thomson Company was actually recorded in the Patent Office April 5, 1912. In the contract the Silesia Company agrees, in consideration of $27,500.00, to deliver an assignment from Harmatta to the Thomson Company. Of the consideration, $7,500.00 were to be paid upon the delivery of the assignment and the balance according to paragraph 5 of the contract, which should be read with paragraph 6:

"5. The Welding Co. further agrees to pay to the Silesia Co. a further sum of Twenty Thousand ($20,000) dollars immediately upon the issue of a United States patent to the Welding Co. for the said invention and application for patent of said Johann Harmatta provided said patent is granted with the present claim 1 of the Harmatta application or a claim of equal scope therewith. For identification said claim is as follows:

'The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes, pressing said electrodes firmly together and closing the circuit, whereby the specified small round, very sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth.'"

"6. The Welding Co. covenants and agrees to vigorously prosecute said application for patent at its own cost and expense
68 and to use its utmost endeavours and those of its legal advisors and attorneys to secure the grant of said patent with a claim of the scope defined in the fifth clause hereof."

This claim 1 was originally claim 2 of the application as amended January 27, 1910. A further amendment was made when the Rietzel claims were taken over for interference purposes, and it became claim 1, followed by the claims taken from the Rietzel patent. After the interference was "won" for the Harmatta application, further amendment dropped this claim. Evidently the expansion, by this last amendment, of the claims from fifteen, which was the number existing when the interference was ended, to twenty-one, as allowed, was considered to occupy the ground covered by this claim 1. Under the contract the Silesia Company retained certain rights of importation which made it necessary to it to have the patent include the scope of the required claim.

Although the Thomson Company was already under this solemn contractual obligation to discard the Rietzel patent and allow the Harmatta patent to issue, for the latter displaces the Rietzel patent to the extent that they conflict, we find it suing the United States Metal Products Company in the United States District Court for the Eastern District of New York on a bill of complaint filed March 28, 1912, setting up the Rietzel patent and asserting, over the oath of its secretary, that Rietzel, prior to February 24, 1905, was the inventor of useful improvements in welding "since commonly known in the art as electric spot or point welding," that is, asserting for the Rietzel patent precisely the force which the Thomson Company had solemnly agreed to allow to Harmatta's claim. Also, November 17, 1910, while the interference proceedings were continuing, and nearly five months after the Thomson Company had filed Rietzel's affidavit to anticipate Harmatta, this company, as Rietzel's assignee, began an action in the Circuit Court of the United States for the Southern District of New York against The National Enameling and Stamping Company for infringement of the Rietzel patent, alleging Rietzel to have been, prior to February 24, 1905, "the original and first inventor of certain new and useful improvements in uniting

component parts of sheet metal structures, since commonly
69 known in the art as electric spot or point welding." The evidence is also before the court that, during the extended period of the interference proceedings and while the Rietzel patent had an apparent vitality afterwards denied it by concessions of the owner, the Thomson Company asserted it in several instances to the extent of demanding and receiving profits upon it as a monopoly, although under contract to displace it.

Another curious circumstance which is of some interest, at least, in this connection, appears in the record to this effect: Patent having issued to the Thomson Company, as the assignee of Harmatta, after this company, as the assignee of Rietzel, in the interest of the new patent, had abandoned all its solemn insistence of priority in Rietzel, and while the appeal in the Boston case was pending, a disclaimer was filed by that company of claims 1 to 6 and 16 to 20 of the Riezel patent, being claims 1 to 6 and 17 to 21 of the Harmatta patent and a further disclaimer of that part of the final specification of Riezel which identified broadly the Rietzel invention with that of Harmatta. The necessity for the disclaimer was obvious under the circumstances and we are not as much interested in the fact as in the reason which was given, as follows:

"That your petitioner has reason to believe that through inadvertence, accident or mistake, and without any fraudulent or deceptive intention, the patentee, in said Letters Patent, has claimed more than that of which he was the original or first inventor or discoverer."

This is a remarkable statement in view of the facts—that twice in the process of amending the specification the clause now disclaimed, which was the foundation for the disclaimed claims, was insisted upon—that even after allowance to Rietzel the specification and claims including these disclaimed portions were held up for the two successive revisions, in the last of which was added one (number 20) of the claims sought to be disclaimed—that as soon as Harmatta's work became known, through the English disclosure, Rietzel's counsel occupied the ground by amendment and by expanding the claims in number from 3 to 23, with a brief asserting very definitely that Harmatta was to be anticipated—that to support
this occupation of the Harmatta territory Rietzel was made
70 to affirm on oath his priority (affidavit of October 23, 1908)—and that prior to the second of the amendments containing these now disclaimed matters, and for the evident purpose of definitely sustaining them as essential portions of his invention, Rietzel was caused to file another affidavit (that of February 18, 1909) in which he more specifically identified, as that which he had done to anticipate the disclosures of the Egel (Harmatta French) patent, the very things afterwards repudiated as unintended. How this evident taking of Harmatta's ground could have been "through inadvertence, accident or mistake" is, in view of these facts, beyond comprehension. The disclaimer is equiva-

lent to saying that Rietzel's affidavits just referred to were fabrications, and wilful ones, too, for they (especially so in the second) were too particular and pointed to allow it to be said of them that their statements were the result of "inadvertence." In this same connection the mind reverts again to Thomson's affidavit, already referred to, of November 30, 1908, filed to support that amendment which was the first to contain this alleged inadvertence and accidental matter. In this affidavit Thomson says:

"That he is familiar with the process of electric welding set forth in the above entitled application of A. F. Rietzel for uniting sheets of metal together by what has been known as the 'spot-welding process' and which forms a practical substitute for the riveting of plates together or for other mechanical expedient for fastening them together face to face;

That one of the methods of uniting pieces of metal together by riveting and for which the aforesaid spot welding process forms a valuable substitute was patented by him by United States Letters Patent dated January 8, 1889, Patent No. 396,015."

These paragraphs precede the one already quoted in which Thomson endeavors to contradict the import of the specification in his patent 396,015. Thomson, when he gave this affidavit, surely knew that Rietzel was being made to claim the things which were afterwards disclaimed. He was not only then and at all times an officer of the disclaimant, but its expert on these very matters.

71 The question of the candor and good faith of this disclaimer grows in seriousness when we recall that it was upon these identical features of the Rietzel patent that the Thomson Company brought the two suits above referred to and proceeded to issue many licenses; and further, when we note that Harmatta's allowance was stalled for more than two years by a further repetition of the "inadvertence, accident or mistake" in the shape of Rietzel's affidavit of June 7, 1910, filed in the interference proceedings. The "invention set forth in the declaration of interference," which his assignee (the Thomson Company) had in him then swear he conceived more than a dozen years before was, as the counts in the declaration show, precisely that which the specification paragraph and the claims now attempted to be disclaimed were in the application to cover. It was to maintain them that the affidavit was filed. The statement in the disclaimer explaining why Rietzel took Harmatta's ground is plainly untrue—it is difficult to resist an impulse to say that it is deliberately untrue. The Thomson Company made a record which very plainly belies its assertions. The incident is more illustrative than directly applicable to the special defense in question, but its illuminative powers are very important.

The Thomson Company will have made this "inadvertence, accident or mistake" extremely profitable, if plaintiff is allowed to maintain its Harmatta patent, for then it will follow that it has obtained protection of its monopoly of this invention from July 20,

1909, to December 2, 1929. It is clear to this court that such a result, upon this record, should not be allowed to follow through the favorable adjudication of plaintiff's right to maintain action on the Harmatta grant. It seems to us clearly against public policy and subversive of equitable principles to give plaintiff a decree which, in sustaining this patent, will operate to give it a monopoly not sanctioned by law.

Pomeroy (Equitable Jurisprudence, Third Edition, Vol. II, Sec. 805), upon authority of many decisions, sums up the conditions which must be met that equitable estoppel may exist, as follows:

"1. There must be conduct—acts, language, or silence,—
72 amounting to a representation * * * of material facts. 2. These facts must be known to the party estopped at the time of his said conduct, or at least the circumstances must be such that knowledge of them is necessarily imputed to him. 3. The truth concerning these facts must be unknown to the other party claiming the benefit of the estoppel, at the time when such conduct was done, and at the time when it was acted upon by him. 4. The conduct must be done with the intention, or at least with the expectation, that it will be acted upon by the other party, or under such circumstances that it is both natural and probable that it will be so acted upon. * * * 5. The conduct must be relied upon by the other party, and, thus relying, he must be led to act upon it. 6. He must in fact act upon it in such a manner as to change his position for the worse."

Each of these six conditions are present in this record, when we consider that a patent grant is adverse to the record when we consider that a patent grant is adverse to the public which is a party to the allowance through representation. The disclaimer which we have just been considering is to be regarded in connection with Pomeroy's fourth requisite that "the conduct must be done with the intention, or, at least with the expectation, that it will be acted upon by the other party, etc." Of course when the Thomson Company caused the Rietzel application to be amended to cover the Harmatta territory, and obtained from him the two affidavits under consideration, and from its welding expert, Thomson, another, the purpose was to affect the judgment, in these precise matters, of the public's representatives in the patent office. So, also, that was the object of Rietzel's affidavit in the interference, as well as that of Tischner, asserting that it was proposed, in good faith, to show, if the time for taking testimony were further extended, that Rietzel had priority over Harmatta; an affidavit made immediately following affiant's return from Europe, where, for his principal, he had entered into a contract to perform which made it impossible to meet the terms of the promise in his affidavit. The purpose of these affidavits was to vitalize, against opposition, the Rietzel claim of monopoly to precisely the features of invention which were after-

wards attempted to be disclaimed. They effected their ob-
73 vious purpose to the great advantage of the Thomson Company which the latter pugnaciously held until, obtaining the Harmatta interest, it no longer needed the protection of the Rietzel grant. To allow the affidavits to be repudiated now is to allow plaintiff to take advantage, to the disadvantage of the public, of what it now would admit was its own wrong against the public. The case before us is in principle covered by Union Manufacturing Company vs. Lownsbury, Federal Cases, 14, 368. Either the Rietzel affidavits state the truth or they were deceptive, intentionally so or most recklessly devised and employed. If they state the facts, we have in the circumstances a prior use displacing Harmatta as an inventor. If they are subject to criticism as untrue, the plaintiff who is intelligently responsible for them, is in this court with unclean hands. It cannot be heard to plead a culpability from which it so greatly profited. It is fair to Rietzel to say that he had no part in the disclaimer. He was not aware, even, that Harmatta had prevailed over him in the interference until so advised by this suit.

We must hold that plaintiff has estopped itself to deny priority in Rietzel, which it so frequently and pertinaciously asserted against the public for years, and that the estoppel is available to defendant here. This alone defeats plaintiff's demand for a decree.

It is difficult to understand how the Patent Office should have allowed itself, without investigating the truth of Reitzel's claim of prior use, to allow by default to Harmatta the invention after it was apprised that both sides were occupied by precisely the same interest, and that to the Thomson Company there was a very great advantage that the office should quietly act as it did. No matter what the office practice was, here it operated to give Harmatta's assignee an undue advantage over the public.

A decree may enter finding the patent invalid and dismissing the bill. October 5, 1920. John M. Killits, District Judge.

74 **Decree Dismissing Bill With Costs.**

(Entered October 5, 1920, by Judge John M. Killits, Sitting by Designation.)

This cause having come on regularly for trial before this Court, and having been submitted for decision on the pleadings and evidence taken and filed therein, and the Court having heard the arguments of the attorneys for the respective parties, and having duly considered said pleadings and evidence, it is now ordered, adjudged and decreed that the plaintiff take nothing by its suit and that the bill of complaint herein be dismissed. And it is further adjudged and decreed that the defendant do recover against the said plaintiff its costs and charges by it in its behalf expended, to be taxed. John M. Killits, District Judge.

O. K. as to form. Stevenson, Carpenter, Butzel and Backus.

75 **Plaintiff's Petition for Appeal.**

[Filed Dec. 16, 1920.]

To the Honorable the Judge of the District Court of the United States for the Eastern District of Michigan, Southern Division:

The above named plaintiff, the Thomson Spot Welder Company, believing itself to be aggrieved by the final decree made and entered in this case as on the fifth day of October, 1920, does hereby appeal therefrom to the United States Circuit Court of Appeals for the Sixth Circuit, and prays that said appeal may be allowed and a citation issued directed to the above named defendant, commanding it to appear before said Circuit Court of Appeals for the Sixth Circuit, to do and receive what may pertain to justice to be done in the premises; that a transcript of the record, proceedings and evidence in the said case, duly authenticated, may be sent to the United States Circuit Court of Appeals for the Sixth Circuit; and that said decree of said District Court may be reversed and such decree made as to said United States Circuit Court of Appeals may seem meet and just. Stevenson, Carpenter, Butzel & Backus, Fish, Richardson & Neave, Counsel for Plaintiff.

76 **Plaintiff's Assignments of Error.**

[Filed Dec. 16, 1920.]

And now comes the plaintiff, Thomson Spot Welder Company, and says that in the final decree made and entered in the above entitled case as on October 5, 1919, there is believed to be manifest error, and for errors it assigns the following:

1. The court erred in not holding the Harmatta patent in suit to be a good and valid patent.
2. The court erred in not holding that the Harmatta patent in suit was infringed by the defendant.
3. The court erred in not finding patentable invention in the subject-matter of the Harmatta patent in suit and in the subject-matter of each of the claims of said patent.
4. The court erred in not finding that Harmatta was the first and original inventor of the subject-matter of the Harmatta patent in suit defined in the claims thereof.
5. The court erred in refusing to order an injunction and an accounting as prayed for in the bill of complaint.
6. The court erred in dismissing the bill of complaint.
7. The court erred in ordering that the plaintiff be required to pay costs to the defendant.

Wherefore the plaintiff prays that the decree of the said District Court of the United States for the Eastern District of Michigan, Southern Division be reversed, and that said court be instructed to enter a decree, ordering an injunction and accounting, with costs to this plaintiff. Stevenson, Carpenter, Butzel & Backus, Fish, Richardson & Neave, Counsel for Plaintiff.

77 **Order Allowing Appeal.**

[Entered Dec. 16, 1920.]

On reading of the petition of Thomson Spot Welder Company, plaintiff, for appeal and consideration of the Assignment of Errors presented therewith, it is ordered that the appeal, as prayed for, be and is herewith allowed.

Cost bond on appeal is hereby fixed in the sum of Five Hundred Dollars ($500), or in lieu thereof a deposit of Two Hundred and Fifty Dollars ($250) in cash. John M. Killits, District Judge.

Petition as to Transcript on Appeal.

[Filed Dec. 16, 1920.]

The parties join in requesting that those portions of the record in the above entitled cause which have been printed for use in the District Court be used as a part of the transcript on appeal without reprinting or reducing to abbreviated or narrative form the testimony therein. Stevenson, Carpenter, Butzel & Backus, J. L. Stackpole, Counsel for Plaintiff. Melville Church, Counsel for Defendant.

78 **Statement of Counsel for Both Parties.**

[Filed Dec. 16, 1920.]

Both parties join in making the above request because both parties desire that the testimony of the witnesses shall be reproduced in the exact words of the witnesses.

The reasons are as follows:

This is a patent suit in which each party has already printed the testimony of its witnesses for use in the District Court. In the record of each party there is the testimony of expert witnesses and the testimony of fact witnesses. The testimony of the expert witnesses on direct examination is in the usual form consisting mainly of long answers on expert questions which can not be condensed. The cross-examination of these expert witnesses is brief and its force and significance would be materially altered if attempt were made to condense it and reduce it to narrative form.

The testimony of the fact witnesses on both sides deals with controverted questions of fact concerning which it is important that the testimony should be reproduced in the exact words of the witnesses because if this were not done the significance, force and effect of the testimony would be altered so that the Appellate Court would not have before it the same record which was before the District Court.

The plaintiff's testimony, consisting of three hundred and twenty-nine printed pages, was taken entirely by deposition out of court

and is in the usual question and answer form but is printed clearly and without confusion.

Of the defendant's testimony consisting of five hundred and twenty-eight printed pages, pages 6 to 223 and pages 439 to 534 were taken by deposition and are printed clearly and without confusion. Pages 225 to 438 were taken in open court and are printed clearly and without confusion although the interjections of counsel and the remarks of the court are occasionally recited. This testimony relates almost entirely to the so-called McBerty
79 prior use concerning which it is very desirable that the testimony should be reported to the Court of Appeals in the exact words of the witnesses in order that the true significance, force and effect of the testimony may be before that court.

It is therefore the sincere opinion of counsel for both parties that no attempt should be made to reduce the testimony of the witnesses to narrative form, but that the record for both parties as printed for the use of the District Court should be used as the record on appeal. J. L. Stackpole, Counsel for Plaintiff. Melville Church, Counsel for Defendant.

Opinion on Application to Not Put Record in Narrative Form.

[Filed Dec. 16, 1920.]

KILLITS, *J.*: We have before us the stipulation of counsel for the parties to this cause, asking that the uncondensed record be allowed to go to the appellate court. We are of the opinion that the essential flavor of the testimony would be lost in condensation, that both sides will suffer materially in an attempt to strictly comply with the rule, and that the rule should be liberally construed in this particular instance, aside from the fact that the condensation would involve a large amount of labor and delays and would entail upon the trial court unusual difficulties in settling contentions respecting accurate condensation. We believe that the only fair way to get this case to a reviewing court is to allow the essential portions of the testimony to go up as it was offered to the trial court, and that the only
80 condensation which would safeguard the interests of both parties would be that only which would omit the mere formal parts of the testimony. It seems unnecessary to go even this far as the parties already have the testimony in printed convenient form.

December 16, 1920. John M. Killits, District Judge.

Order that Record be Not Reduced to Narrative Form.

[Filed Dec. 16, 1920.]

On reading of the petition of counsel for plaintiff and counsel for defendant in the above entitled cause for authority to use as a part of the transcript on appeal, without reprinting or reducing to an abbreviated or narrative form, those portions of the record in the above entitled cause which have been printed for use in the District Court,

and consideration of the contents of the printed record filed in this court and the statement of counsel for both parties filed with the petition, pursuant to Rule 15 of the United States Circuit Court of Appeals for the Sixth Circuit, and General Equity Rule No. 75, authority is hereby granted to use those portions of the record in this cause which have been printed for use in the District Court, as a part of the transcript on appeal, without reprinting or reducing to an abbreviated or narrative form the testimony therein. John M. Killits, District Judge.

81 **Stipulation in Refiling Printed Records.**

[Filed Jan. 25, 1921.]

It is hereby stipulated by and between counsel for the respective parties, that a complete printed copy of plaintiff's record as used in this Court, and a complete printed copy of defendant's record, may be filed with the Clerk of said Court and become a part of record on appeal.

It is further stipulated that the opinions, decrees and orders referred to in plaintiff's bill, as annexed thereto and printed with plaintiff's bill of complaint as a part of the record of this Court, may for all purposes be taken and considered as if certified copies of said decrees, orders, etc., were physically annexed to said bill of complaint.

It is further stipulated that the "answer" referred to in the præcipe for appeal shall be construed as the amended answer, as filed by defendant and as by previous stipulation substituted therefor. Stevenson, Carpenter, Butzel & Backus, Attorneys for Plaintiff. Barthel Flanders & Barthel, Attorneys for Defendant. Dated January 21, 1921.

82 **Præcipe.**

[Filed Dec. 17, 1920.]

The plaintiff-appellant indicates the following as the portions of the record to be incorporated in the record on the transcript on appeal:

Bill of complaint;

Answer;

All stipulations contained in the printed record as used in this court;

All testimony contained in the printed record as used in this court in the exact words of the witnesses;

Copies of patents and exhibits contained in the printed record as used in this court;

Opinion of the court;

Final decree;

Petition on appeal;

Assignment of errors;

Recital of deposit in lieu of bond on appeal;
Petition as to transcript on appeal;
Præcipe.

The plaintiff-appellant requests that all the original exhibits be forwarded to the Court of Appeals. Stevenson, Carpenter, Butzel & Backus, J. L. Stackpole, Counsel for Plaintiff-Appellant.

Agreed to. Melville Church, Counsel for Defendant-Appellee.

83

Amended Præcipe.

[Filed Feb. 4th, 1921.]

The plaintiff-appellant indicates the following as the portions of the record to be incorporated in the record on the transcript on appeal:

Bill of complaint;
Amended answer;
Stipulation as to amended answer;
All stipulations contained in the printed record as used in this court;
All testimony contained in the printed record as used in this court in the exact words of the witnesses;
Copies of patents and exhibits contained in the printed record as used in this court;
Memorandum opinion of the court;
Final decree;
Petition on appeal;
Assignments of error;
Opinion of the court on petition not to reduce testimony to narrative form;
Order allowing appeal and cash deposit in lieu of bond.
Petition as to transcript on appeal;
Stipulation as to filing of printed record used in District Court;
Order extending the time for docketing of appeal.
Amended præcipe;
Order extending time for docketing appeal.

The plaintiff-appellant requests that all the original exhibits be forwarded to the Court of Appeals. Stevenson, Carpenter, Butzel & Backus, Solicitors for Plaintiff-Appellant.

Agreed to. Barthel, Flanders & Barthel, Solicitors for Defendant-Appellee.

84 & 85

Order Extending Time to File and Docket Printed Record on Appeal to Feb. 15, 1921.

[Entered Jan. 15, 1921.]

Upon the application of the Clerk of this Court, for cause shown it is by the Court now here ordered that the time in which to file and docket printed record on appeal in this cause, be and the same is

hereby extended to and including the fifteenth day of February, A. D. 1921. Arthur J. Tuttle, United States District Judge.

Order Extending Time to File and Docket Printed Record on Appeal to March 15, 1921.

[Entered Jan. 25, 1921.]

Upon the application of the Clerk of this Court, for cause shown, it is by the Court now here ordered that the time in which to file and docket printed record on appeal in this cause, be and the same is hereby extended to and including the 15th day of March, A. D. 1921. Arthur J. Tuttle, United States District Judge.

A true copy. Attest: Arthur B. Mussman, Clerk U. S. Circuit Court of Appeals for the Sixth Circuit.

86 NOTE.—The first 27 pages of this volume are reprinted in Volume I. Otherwise this volume is the same as used in Argument in the District Court.

Stipulation in Refiling Printed Records.

[Filed Jan. 25, 1921.]

It is hereby stipulated by and between counsel for the respective parties, that a complete printed copy of plaintiff's record as used in this Court, and a complete printed copy of defendant's record, may be filed with the Clerk of said Court and become a part of record on appeal.

It is further stipulated that the opinions, decrees and orders referred to in plaintiff's bill, as annexed thereto and printed with plaintiff's bill of complaint as a part of the record of this Court, may for all purposes be taken and considered as if certified copies of said decrees, orders, etc., were physically annexed to said bill of complaint.

It is further stipulated that the "answer" referred to in the praecipe for appeal shall be construed as the amended answer, as filed by defendant and as by previous stipulation substituted therefor. Stevenson, Carpenter, Butzel & Backus, Attorneys for Plaintiff. Barthel, Flanders & Barthel, Attorneys for Defendant. Dated January 21, 1921.

87 District Court of the United States, Eastern District of Michigan, Southern Division.

In Equity.

THOMSON SPOT WELDER COMPANY, Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

On Harmatta Patent No. 1,046,066.

Evidence for the plaintiff taken under the Revised Statutes of the United States and the Equity Rules of the Supreme Court by agreement of counsel. Before me, Harrison F. Lyman, Notary Public.

Met pursuant to agreement of counsel at the office of Fish, Richardson & Neave, 84 State Street, Boston, Mass., at 10 a. m., March 6, 1918.

Present: J. L. Stackpole, Esq., of Counsel for Plaintiff.

Counsel for plaintiff offers in evidence a certified copy of the certificate of incorporation of the Electric Welder Company, dated November 22, 1916, and the same is marked "Plaintiff's Exhibit No. 3, Copy of Certificate of Incorporation of Electric Welder Co.

Plaintiff's counsel offers in evidence a certified copy of the change in name of the Electric Welder Company to the Thomson Spot Welder Company, dated December 18, 1916, and the same is marked "Plaintiff's Exhibit No. 4, Certificate of Change in Name of Electric Welder Company to Thomson Spot Welder Company."

Plaintiff offers in evidence a printed Patent Office copy of the United States Letters Patent No. 1,046,066, granted December 3, 1912, to the Thomson Electric Welding Company of Lynn, Mass., a corporation of Massachusetts, on the application of Johann Harmatta of Szepesvaralja, Austria-Hungary, and the same is marked "Plaintiff's Exhibit No. 5, Harmatta Patent in Suit."

It being agreed by the counsel for the respective parties that copies of the title papers of said Harmatta patent may be offered and used in evidence with the same force and effect as the originals, and that the defendant's counsel waives the proof of the signatures on said title papers, plaintiff's counsel offers in evidence as one exhibit a copy of an agreement between the Universal Elec-

tric Welding Company and the Thomson Electric Welding Company, dated June 17, 1909; a copy of an agreement between the Thomson Electric Welding Company and the Electric Welder Company, dated November 22, 1916; and a copy of an agreement between the Universal Electric Welding Company and the Electric Welder Company, dated November 22, 1916, and the same are marked "Plaintiff's Exhibit No. 6, Title Papers of Harmatta Patent in Suit".

JAMES H. GRAVELL, having been duly sworn, deposes and says as follows:—

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation.

A. My name is James H. Gravell; my age is thirty-seven; my residence is 129 Columbia Heights, Brooklyn, N. Y.; my occupation is consulting engineer in electric welding and metal working processes.

Q. 2. What experience have you had in the practice of electric welding and to what extent have you studied its principles?

A. My first experience in electric welding was in 1896, when I welded the abutting ends of fine wire with a battery.

In 1898 I was graduated from the Manual Training School of Philadelphia, Penn., and entered the employ of the Electric Storage Battery Company of Philadelphia, where I assisted in arc welding sheet lead.

Later in the same year I became associated with the Elwood Ivins Tube Company of Philadelphia and developed a method of welding the seams of umbrella rods. The development, however, was cut short by the failure of the company.

In the early part of 1901 I designed and installed a butt welding outfit for welding the abutting ends of automobile rims at the American Tube & Stamping Company in Bridgeport, Conn. The installation was highly successful. The following year I designed and built a second machine to take care of the increased output. I also designed and built a machine for electrically welding the abutting edges of the seams of tubes.

In 1902 I came back to Philadelphia and established an office at

1003 Drexel Building. During the next three years I installed arc welding at the Baldwin Locomotive Works, Philadelphia, Pa., and at the Sea Board Steel Casting Company, Chester, Pa.

In 1908 I entered the employ of the Philadelphia Electric Company and continued the development of my arc welding process which I had covered by patent. While with that company I made an exhaustive study of the design and construction of transformers.

The Hale & Kilburn Company of Philadelphia made me an offer in the early part of 1910, and I left the Philadelphia Electric Company and entered their employment as "Engineer on Electric Welding". During my employment I made a two years' study of the properties of the welding circuit.

Up to this time my methods of designing welding apparatus had been based on the calculations of electrical apparatus as applied to the design of lighting transformers, dynamos and motors, as taught in the various colleges and contained in the various text books. I then decided to investigate the theory of the subject along original lines. In my investigations I was assisted by my cousin, William H. Gravell, who helped me materially in the difficult mathematics of the subject. He was an expert mathematician.

We found that my calculations for butt welding were fairly correct, but were of no value in calculating the welding circuit for spot welding, especially when carrying out the process with pointed electrodes. This was for two reasons: first, the current used for spot welding was comparatively large and many factors which could be neglected in the ordinary lighting circuit became important in spot welding: and second, the heat losses in spot welding had to be treated very differently from those in an ordinary circuit.

The investigation, which was thorough and occupied fully two years, went into the subject from both the theoretical and practical sides.

I developed many spot welding operations for the Hale & Kilburn Company and designed and built many welding machines, many of which were used for spot welding automobile parts and the interior finish of cars. Many of the processes and machines were strictly new and I covered them with patents.

On leaving the Hale & Kilburn Company the latter part of 1914, I established an office at 1126 South Eleventh Street, Philadelphia,

Pa., and devoted myself to consulting work, a large part of which was connected with electric welding.

Q. 3. Explain the process described in the Harmatta patent in suit.

A. The object of the Harmatta process is to provide an electrical method for replacing the well-known riveting operation.

The process is intended to be used on superimposed metal sheets to replace riveting, without changing the work in any way, with the exception of omitting the rivet holes and the rivets.

The sheets to be processed, according to Harmatta, are lapped or placed one on top of the other (the same as in riveting), and are assembled in the exact relation to each other which they are intended to hold in the finished product (the same as in riveting). See Fig. 1 of the Harmatta patent.

The superimposed sheets are placed between two opposed tools *a*, *b* (the same as in riveting) and the pressure is exerted by the tools towards the sheets (the same as in riveting).

Harmatta's work-engaging tools *a*, *b* differ, however, from the work-engaging tools used for riveting. Harmatta's tools consist of electrical conductors, which are the terminals of an electric circuit, and are so shaped that they bear on the superimposed thicknesses of sheet metal which constitute the work, over a small or restricted area; that is, his work-engaging terminals or electrodes *a*, *b* are tapered or pointed.

When the sheet metal is treated according to Harmatta, the sheets to be united are lapped or superimposed and pressed together between Harmatta's tools and a current of electricity is passed from one tool to the other through the work. That portion of the superimposed sheets between the tools is brought to a high temperature while it is confined on all sides by relatively cold metal. The high temperature softens the work at this place, but the heated soft metal being confined by the relatively cold metal cannot extrude.

The pressure exerted by the tools forces the softened metal of the sheets into intimate molecular contact and it coheres, that is, it welds. The current is then interrupted and the tools removed from the superimposed sheets. The heated spot cools almost instantly, due to the masses of cold metal surrounding it.

The weld produced between the superimposed parts to all intents

and purposes takes the place of a rivet. A second weld may be made at a remote place, or close to, or even overlapping the first weld.

The weld occurs only at the small isolated spot between the electrodes, which spot has been electrically heated and pressed, and owing to these characteristics it has become technically known as a "spot weld", a term which has been generally accepted as applying solely to a weld produced by Harmatta's process.

The heat marks of a completed weld show that the current has been confined to a restricted area as it passed through the work, the size of the restricted area being governed by the size of the work-engaging surface of the tools used; in other words, the work-engaging tools have concentrated the current and pressure.

The process is very simple and quick. It entirely dispenses with clamps and rolls and is commercially very inexpensive, as no preparation for the work is required and no dressing or finishing of the weld is necessary after the welding has been completed.

The principal characteristics of the Harmatta process are:

1. The superimposed sheets being welded do not move in relation to each other during the welding operation;

2. The current for welding is concentrated by the electrodes;

3. The pressure for welding is concentrated by the electrodes;

4. The metal heated for welding is confined by relatively cold metal; and

5. There is no extruded metal.

Q. 4. To what uses is the spot welding process of the Harmatta patent applicable in the commercial arts, and to what extent has it been applied?

A. The spot welding process as described by Harmatta has been of great commercial value, as it is not only cheaper and stronger than riveting, but it can be used where riveting is costly and objectionable. An example of this is the interior finish of steel railroad cars. When rivets are used the constant vibration of the car causes the painted finish to crack around the rivet. This does not happen when spot welding is used.

There is hardly a sheet metal industry in which spot welding cannot be advantageously applied. The range of spot welding can be well appreciated when we see that it is used not only on large work

like railroad cars and motor trucks, but also on such small articles as the small metal signals used in card index files.

The interior steel finish of buildings, automobile bodies and parts, cooking utensils, stoves and furniture are being spot welded every day in large quantities.

My profession has enabled me to visit many of the metal working plants throughout the country and I therefore know the wide extent to which the spot welding process has been applied. No shop is too small to have its spot welding machine and in some small shops the spot welding machine is practically the only machine tool which they possess.

Spot welding has been the greatest improvement in electric welding since its conception by Professor Thomson and at the present time is used much more than Thomson's butt welding process. In many factories spot welding is used when butt welding is unknown.

The introduction of spot welding gave new life to the electric welding industry and its use is constantly increasing.

Q. 5. Please compare the process practiced by the Ford Motor Company as disclosed by the defendant's answers to the plaintiff's interrogatories with the process described in the Harmatta patent and the product of the defendant's process with the product of the process of the Harmatta patent.

A. According to the defendant's answers to the plaintiff's interrogatories, the Ford Motor Company is using machines one of which is illustrated in the picture Exhibit No. 1. These machines are used to produce welds such as occur in the automobile part which constitutes Exhibit No. 2.

These machines consist of extending arms or brackets the extremities of which are provided with work-engaging, tapered electrodes of good electrical conductivity. These electrodes are mechanically arranged to be moved toward and away from each other and constitute the terminals of a welding transformer, the primary of which contains an operating switch.

These machines are used for welding two or more superimposed thicknesses of metal constituting the work, by pressing the work together between the pointed electrodes, passing current from one of the electrodes to the other through the work while it is being pressed between the electrodes.

After the weld is completed, the current is interrupted and the welded work removed from between the electrodes. An example of the product of the process is shown in Exhibit No. 2 illustrating how the process is repeated a number of times on the same article to produce a number of welds.

The exhibit shows a number of isolated welds, which are technically known as "spot welds".

It is evident that the metal heated for welding has been confined by relatively cold metal and that no extruded metal has occurred. (In one case the metal from the weld has extruded, but this is a defective weld.)

It is also clear from Exhibit No. 2 that the superimposed thicknesses of metal did not move in relation to each other during the process, for prior to the processing these parts were placed in close overlapping contact and could not possibly move. This is especially clear when we consider that after the first weld was made the two parts were locked together.

The answers to the interrogatories considered in connection with Exhibits Nos. 1 and 2 clearly describe the same process as is described in Harmatta's specification.

In both cases pointed electrodes concentrate the current and the pressure which are applied to the superimposed thicknesses of metal which constitute the work, the weld occurs in the work between the electrodes and is restricted to the spot where the current and pressure are concentrated. During the welding process the superimposed parts do not move in relation to each other, the metal heated for welding is confined by relatively cold metal and no extruded metal is produced.

I know of my own knowledge that the answers to the interrogatories are correct and that the Harmatta process is used at the Detroit plant of the Ford Motor Company, for on January 9, 1918, I visited the Ford plant and saw machines arranged to carry out the Harmatta process shown in Exhibit No. 1, and I personally operated one of these machines and found that it produced a spot weld according to Harmatta's process. The specimen which I welded I here produce.

(Plaintiff's counsel offers in evidence the specimen produced by the witness, and the same is marked "Plaintiff's Exhibit No. 7, Gravell Specimen of Ford Welding".)

Boston, April 16, 1918, 10 A. M.

Met pursuant to agreement of counsel.

Present: J. L. Stackpole, Esq., Counsel for Plaintiff;
Melville Church, Esq., Counsel for Defendant.

By agreement the direct examination of Mr. Gravell is resumed.

Q. 6. Please examine the metal tube, Plaintiff's Exhibit No. 2, attached to plaintiff's interrogatories, and state what you find to be the characteristics of the welds appearing in that exhibit.

A. The superimposed portions of this tube contain welds which join the parts together. These welds are isolated spot welds; that is, small welds surrounded by unwelded areas. The metal directly over the welds has been substantially unaltered by the welding operation.

Plaintiff's counsel offers in evidence the plaintiff's interrogatories and the defendant's answers thereto.

Cross Examination.

By Mr. Church.

×-*Q.* 7. Mr. Gravell, are you now connected with any concern or corporation as an officer or employee?

A. I am connected with the Tilghman Brooksbank Sand Blast Company as vice-president, and also connected with the American Chemical Paint Company as president and consulting engineer. These companies are located at 1126 South Eleventh Street, Philadelphia, Pennsylvania. The American Chemical Paint Company is a corporation of Delaware, and the Tilghman Brooksbank Sand Blast Company of New Jersey.

×-*Q.* 8. How long have you been connected with these two corporations respectively?

A. My connection with both companies dates from about the latter part of the year 1914.

×-*Q.* 9. How long have you been retained by the plaintiff herein, Thomson Spot Welder Company, or its predecessor-in-name, the Electric Welder Company, or its predecessor-in-title, Thomson Electric Welding Company?

A. I am not now retained directly by the Thomson Company, but have been retained since approximately last June by Townsend

& Decker, located at 149 Broadway, New York, as consulting engineer.

×-*Q.* 10. When did you first begin to assist Townsend & Decker in connection with electric welding?

A. Townsend & Decker called one day for my services, which were of a temporary nature, in connection with the DeFerranti interference, which was some time prior to the time at which I was definitely retained.

×-*Q.* 11. Were you first consulted by Townsend & Decker after the declaration of the DeFerranti interference, by which I assume you mean the interference that is now pending between an application of DeFerranti and the Harmatta patent here in suit?

A. It was after the declaration I was consulted.

×-*Q.* 12. Are we to understand, then, that you were not consulted by Townsend & Decker nor by the Thomson Spot Welder Company, or its predecessor-in-title, Thomson Electric Welding Company, prior to the declaration of the DeFerranti-Harmatta interference?

A. I understand from the testimony in behalf of Sebastian DeFerranti that this interference was declared October 2, 1913, and can answer the question by saying that up to that date I had never been consulted by the Thomson Company or any of its predecessors or connections. Neither had I been consulted by Townsend & Decker up to that time.

×-*Q.* 13. When in your direct examination in this case you testified that "spot welding has been the greatest improvement in electric welding since its conception by Prof. Thomson" you were referring to Prof. Elihu Thomson of Lynn, Massachusetts, were you not?

A. Yes, I was referring to Prof. Elihu Thomson.

×-*Q.* 14. What was the conception of Prof. Thomson that you had in mind when you made this statement to which I have referred, and when approximately was that conception first made known to the world?

A. The conception I referred to was made known to the world by a series of patents issued to Prof. Thomson, starting with patent No. 347,140, dated August 10, 1886. Prof. Thomson's conception of electric welding consisted in passing current across the

abutting ends of two objects for the purpose of heating them, which on obtaining the proper temperature were forced together and caused to weld.

×-*Q.* 15. According to Prof. Thomson's conception, the abutting surfaces, which are the objects to be welded, were first pressed together, the welding current was then passed through the parts, and further pressure was applied to effect the welding, was it not?

A. This is substantially true.

×-*Q.* 16. What was the nature of the current employed according to Prof. Thomson's conception?

A. In Prof. Thomson's form of welding a current of large volume was employed.

×-*Q.* 17. You mean large volume and low voltage?

A. Prof. Thomson was interested in securing a large volume of current, and it naturally followed that a small voltage was used.

×-*Q.* 18. What relation of amperage to voltage of current did Prof. Thomson suggest?

A. It is difficult to give generally the relation between the voltage and the amperage. The amperage must be sufficient to bring the abutting surfaces to a welding temperate and the voltage must be sufficient to produce the requisite current. The ordinary conception of Thomson's welding might be summed up in popular language in saying that currents of high amperage and low voltage were employed.

×-*Q.* 19. Currents with an amperage as high as 8 or 10,000 amperage and with a voltage of two or three volts might be employed in the practicing of Prof. Thomson's method, might they not?

A. That is true at the present day, but it is a question at the time we are speaking of, that is, the early days of electric welding, whether quite as large currents were employed.

×-*Q.* 20. What is this "greatest improvement in electric welding" which you would characterize a spot welding? Will you please define it?

A. Spot welding is that which has certain definite characteristics. Some of these characteristics are as follows: the current for welding is concentrated by the electrodes; the pressure for welding is concentrated by the electrodes; the spot heated for welding is

entirely surrounded by relatively cold metal; the parts being welded do not approach each other bodily; there is no extruded metal; the expansion due to the heated spot tends to force the parts being welded together. In explanation of this last characteristic, I will add that when metal is heated it expands, and as the metal which is heated for welding is entirely surrounded by relatively cold metal any expansion of the parts heated for welding tends to force the said parts heated for welding together. It is quite clear that in locating two bodies in close contact and surrounding them with cold metal that when these parts are heated they naturally expand, and as they have been confined they naturally press against each other.

×-*Q.* 21. Have you now explained what you deem to be the essential characteristics of spot welding? If not, and there is anything essential to be added, will you please state what it is?

A. I might add that the heat is generated within the parts to be welded, that no preparation of the material is required, and on completion the weld does not have to be dressed.

×-*Q.* 22. Now will you please state the essential characteristics of an apparatus by means of which, according to your notion, spot welding, so called, may be practiced?

A. The primary characteristics of an apparatus for spot welding must be a means for passing current from one terminal to another terminal, which are in contact with the work; at least one of the terminals must have a relatively small contact on the work. There must also be means for pressing the two terminals against the work. Commercially it is found advisable to have two copper terminals, one of which has been tapered or pointed, and these two terminals arranged directly in a line with each other, so that the parts of the work may be pressed together between these terminals. It is also necessary in a welding machine to provide means of supplying the proper current.

×-*Q.* 23. What is a proper current?

A. The proper current depends on the various qualities of the work, and on the time in which the welding is to be accomplished.

×-*Q.* 24. If the proposition is to unite two thin plates of metal, what is the necessary current that must be employed?

A. It would of course be a very inaccurate answer to state any

amount of current because you have not told me the thickness of the sheets and the time in which the welding is supposed to be done.

×-*Q.* 25. Is there no known law regulating the matter? If so, please state it.

A. The amount of current can be calculated or determined by a series of experiments. In order to calculate the amount of current, there is no simple law governing the matter, but the laws of resistance, the laws of conductivity of heat, and the laws governing specific heat enter into the calculation.

×-*Q.* 26. Am I to understand, then, that you cannot state the rule or law governing the matter inquired about? It would seem from your answer previously given that a cut and try method must be adopted.

A. Unless the problem was calculated, the determination of the proper current must depend on previous experiences.

×-*Q.* 27. But if you had no previous experience, then you must rely upon calculation, must you not?

A. By previous experience, I mean the experiment which preceded the securing of a satisfactory weld. This experience may be that of the experimenter or of experimenters preceding. I do not wish to be understood to mean that a person not being able to calculate, and having had no previous experience, would be unable to make a spot weld. This is especially true at the present time when machines are placed on the market all ready for the layman to operate on work within range of the machine.

×-*Q.* 28. How long has spot welding as you have defined it been known in this country?

A. I cannot answer that question broadly.

×-*Q.* 29. How long so far as your knowledge or information goes?

A. I have personally come in contact with spot welding since the year 1907, that is, my first actual contact with spot welding was about the year 1907.

×-*Q.* 30. Did you evolve spot welding from your inner consciousness, or was the idea of it communicated to you; and, if so, by whom, and under what circumstances?

A. As far as I can remember, the first time I heard of spot welding was after a lecture which I gave before an engineering society composed of the employees of Dodge & Day, Philadelphia, Pa.

This lecture referred to electric welding and Mr. Zimmerman, after my talk, mentioned that I had not referred to spot welding. Mr. Zimmerman was one of the officers of the company. On second thought I cannot absolutely fix the time as in 1907, but it was somewheres near that date, and can easily be determined through Mr. Kern Dodge or Mr. Zimmerman.

×-*Q*. 31. Now please tell us, as precisely as you can, what Mr. Zimmerman's communication to you was that gave you your first apprehension of spot welding, so called.

A. Mr. Zimmerman had been connected with the American Pulley Company, and he described the machines which did projection welding at that company, and in his talk he referred to the welds made thereby as spot welds.

×-*Q*. 32. Were they spot welds as you used the term in your direct examination?

A. The result of the operations at the Pulley Company were substantially the same as the process which I have described. The two processes, however, were different. I mention the Zimmerman affair as it was the first time I had heard the term "spot weld". In the case of the Pulley Company, projections were provided on one or both of the parts to be welded together, and the parts pressed together between two blunt dies. In the process which I have described as spot welding, no preparation of the material was required. The first time I came in contact with spot welding, as described by me, was at the Hale & Kilburn Company in 1910.

×-*Q*. 33. In 1910 was what you now call "spot welding" arrived at empirically by you, or did somebody communicate the idea to you?

A. While I was employed by the Hale & Kilburn Company in the early part of January, 1910, they had already been using spot welding for some little time.

×-*Q*. 34. Describe what they had been doing.

A. The Hale & Kilburn Company manufactured interior finish of steel cars and car seats, and it was on this class of work that they had been employing spot welding. In some cases they provided projections on their work, whereas in other cases pointed electrodes were used without any projections on the work at all.

×-*Q.* 35. Then it was from Hale & Kilburn that you first learned of spot welding. Am I right about this?

A. That is right; but having been to the factory of the Hale & Kilburn Company some months previous to my employment by them, I first saw spot welding in their plant at that time.

×-*Q.* 36. What do you mean by "spot welding" in your last answer?

A. By "spot welding" I mean welds made without any preparation of the material by pointed electrodes.

×-*Q.* 37. Do you draw a distinction between "spot" welding and "projection" welding? If so, what is the distinction?

A. There has been some confusion regarding the two methods which result in a similar product. I refer to the electrode method and the projection method. In the electrode method, the current is concentrated by the electrodes, the pressure is concentrated by the electrodes, the metal heated for welding is completely surrounded by relatively cold metal, the parts being welded do not move bodily towards each other, there is no extruded metal, no preparation of the work is required.

In the projection method the current is concentrated by means of a projection on the work. The pressure is also concentrated by the same projection. Owing to the projection preventing the contact of the plain surfaces of the work, which projection is mashed down in the operation, the parts being welded do move toward each other. The metal heated for welding, that is the projection, is not entirely surrounded by relatively cold metal. As the whole operation depends on the projection, the work necessarily must be prepared by providing this projection.

×-*Q.* 38. I show you copy of patent to Rietzel, No. 928,701, dated July 20, 1909, application filed February 24, 1905, and ask you whether that patent, with which I presume you are perfectly familiar, discloses a method of spot welding and an article produced by a spot welding method such as you have characterized as a spot welding method and a spot welded product in your direct examination, or is it an exposition of the projection method referred to in your answer to the last question?

A. Rietzel patent No. 928,701 shows a method and a product which I have described as "projection" welding in my last answer.

what had already been accomplished at the Hale & Kilburn Company previous to my employment by that company.

×-*Q*. 48. Then as a matter of fact the art of spot welding was an accomplished fact and in practical operation when you first became acquainted with it and such experiments as you and your cousin made were for the purpose of demonstrating how the results already accomplished had been accomplished. Am I not right about this?

A. The art of spot welding at the time of my employment with the Hale & Kilburn Company was developed to some little extent, but I understood from the Hale & Kilburn Company that very few others were using it at that time, and my investigation was to determine the general principles on which the results depended and to increase the scope of spot welding, so that it could be applied to much heavier work.

×-*Q*. 49. If I place two overlapped sheets of thin metal between opposite electrodes and then apply a pressure to one or both of the electrodes, so as to clamp the sheets firmly between them, and then pass a welding current of electricity through the electrodes and through the plates, while maintaining the pressure, will I have practiced spot welding as you understand it, although I have made but one weld?

A. That depends on whether the electrodes are the means of concentrating the current and pressure. If that is the case, you have made a spot weld

×-*Q*. 50. Would this be so whether or not the contact faces of the electrodes, or one of them, are of smaller area than the area of the sheets or plates operated upon?

A. Generally stated, yes.

×-*Q*. 51. In order to practice spot welding, then, it is not necessary that the articles to be welded are united at more than one spot. Is that correct?

A. One spot is sufficient to show an example of spot welding.

×-*Q*. 52. Suppose the electrodes were applied only at the edges of overlapped plates, so as to extend clear to margins thereof; is that spot welding?

A. It is spot welding in so far as the characteristics of this proposition agrees with the characteristics of spot welding as I have

noted in my previous answers. From the spot welding standpoint, it may be termed a "defective" spot weld, the same as riveting together at the extreme edges would be called a defective rivet.

×-*Q.* 53. Suppose that two strips of thin metal two inches wide have their ends overlapped to the extent of one inch, and that the electrodes employed to unite these overlapped parts have each a contact surface of one-quarter of an inch in area, and that these electrodes are applied once only to the overlapped ends, so as to make one weld of approximately one-quarter of an inch in area at the very middle of said overlapped portion; would that be spot welding?

A. Yes.

×-*Q.* 54. In the case last supposed imagine two welds to be made, viz., one extending to the extreme lateral edge of the overlapped portion at one side, and the other to the extreme lateral edges of the overlapped portions at the other; would that be spot welding?

Mr. STACKPOLE. This line of questions relating to hypothetical propositions is objected to as hypothetical and indefinite and outside the scope of the direct examination.

A. In so far as these welds agree with the characteristics which I have enumerated as spot welding, they are spot welds.

×-*Q.* 55. Still adhering to our supposed case, assume that the first weld were made at the extreme lateral edge of the overlapped bands at one side edge, that the second weld was made so as to overlap the first, and the third so as overlap the second, and so on across the bands to the opposite edge; would that be spot welding?

A. According to my judgment each weld at the time it was made would be a spot weld.

×-*Q.* 56. Suppose now that the two overlapped bands of thin metal are operated upon by two narrow electrodes, and extend way across the bands from side to side, so as to in operation make one continuous weld extending from side to side; would that be spot welding?

A. I do not believe that an effort to make such a weld would be commercially successful, and I must awswer the question by saying

that were such a thing possible it would be a spot weld in so far as it agrees with the characteristics which I have mentioned.

×-*Q.* 57. In spot welding must the resistance of the electrodes be less than that of the interposed plates to be welded?

A. Theoretically, no; but practically, yes.

×-*Q.* 58. What happens if the resistance of the electrodes is greater than that of the interposed plates?

A. I understand from this question that we are speaking of specific resistance of materials. Using a number of electrodes of different specific resistances, those of a high specific resistance will get hotter than those of a low specific resistance. In case carbon electrodes are used of the size usually employed for copper electrodes, and using the same current as would have been used with the copper electrodes, the carbon electrodes will become highly heated.

×-*Q.* 59. If you would use electrodes of high resistance material such as carbon with which to spot weld, you would have to employ a current of greater voltage than that usually employed, wouldn't you?

A. The total voltage acting on the welding circuit would have to be increased in proportion to the increase in resistance, provided the same current is to be maintained through the welding circuit.

(Adjourned until 2 P. M.)

×-*Q.* 60. Does the Harmatta patent state of what substance the electrodes are to be composed?

A. According to my understanding of the Harmatta patent, it is implied that these electrodes are of a good conducting material. Harmatta refers to electric welding of a certain type in which it was customary at that time to make the clamping electrodes of copper. Harmatta does not distinctly mention that the electrodes should be of copper.

×-*Q.* 61. Can you give an instance in the prior art where clamping electrodes are said to be of copper?

A. I cannot recall any specific literature on that matter, but I personally have known of butt welding machines in use in the year 1900 the clamping jaws of which were of copper.

×-*Q.* 62. But those were machines in which the work itself was

held by the clamping jaws, as in the Thomson butt welding machine, were they not?

A. That is correct. I have been referring to a Thomson butt welding machine.

×-*Q.* 63. You know of no instance in the prior art, I take it, in which pressure electrodes intended to clamp metal plates for the purpose of welding them were made of copper?

A. Offhand, I do not know whether pressure electrodes of copper were employed, but this could readily be ascertained by examining the patents of the prior art.

×-*Q.* 64. Does the Harmatta patent specifically mention the metal of which the parts or plates to be united are composed?

A. From a quick examination of the patent I would say that the composition of these plates was not specified except in so far that Harmatta refers to cooking utensils, which are usually of steel or iron, and uses the term "electric welding", which was most usually practiced on steel or iron.

×-*Q.* 65. Is the method of the Harmatta patent limited to the uniting of plates of any particular thickness?

A. Without trying to interpret Harmatta's patent, it is my judgment that it is not limited as to any specific thickness of material.

×-*Q.* 66. The two plates shown in Fig. 1 of the patent are apparently of the same thickness. Do you find anything in the patent indicating plates of different thicknesses were proposed to be united?

A. I cannot remember any specific instructions in the Harmatta patent regarding the welding of plates of different thicknesses, but as it is often customary in kitchen utensils to have some of the parts thicker than other parts, I should suppose that Harmatta realized that the metals would not have to be of the same thickness.

×-*Q.* 67. Does the patent give any instructions as to the voltage or amperage of the current to be employed?

A. Only in so far as he refers to what he means by electric welding, where it was customary to have large currents and low voltages.

×-*Q.* 68. Does the patent indicate how the current employed is to be produced?

A. Only so far as his term "electric welding" applies.

spot welded is limited owing to our inability to apply the requisite pressure and the required current.

×-*Q.* 81. Would not the internal resistance of the plates themselves to the passage of the current depend both upon the thickness of the plates and the materials of which the plates were composed?

A. In one sense this is correct, but resistance depends on three dimensions: area and length, and is not entirely governed by the two factors which you mentioned.

×-*Q.* 82. Can you spot weld a thin plate of copper to a thin plate of iron?

A. I have never seen this done by the electrode method of spot welding.

×-*Q.* 83. What is your opinion as to whether or not it may be done?

A. I would say that it is possible, but I have had no experience in welding these two materials by spot welding.

×-*Q.* 84. May two thin plates of copper be spot welded?

A. I consider it possible to weld copper together, although it is rather difficult.

×-*Q.* 85. Would not the intimacy of contact between electrodes and plates in spot welding affect the generation of heat at those points?

A. By intimacy of contact I understand you to mean a larger contact, because, electrically speaking, either the parts are in contact or not in contact. If a very large current were passed through a small contact, there would be more heat generated than if a small current was passed through a large contact.

×-*Q.* 86. Would the amount of pressure of the electrodes on the plates affect the generation of heat between the electrodes and plates, the impressed current being constant?

A. Up to a certain point, yes.

×-*Q.* 87. And I suppose the material of which the electrodes are composed would affect the generation of heat between the electrodes and plates, would it not, — electrodes of lower conductivity and higher resistivity producing more heat at the points between the electrodes and plates?

A. I cannot say definite regarding this because it so happened that the poorer conductors of electricity are also poorer conductors

of heat, and it may be that although the same amount of heat might be generated, still the temperature would be greater in the case of the poor electrical conductor, because less heat would be conducted away from that point.

×-*Q.* 88. According to the Harmatta patent are any limitations at all placed upon the characteristic of the electrodes employed?

A. According to my understanding of Harmatta's patent, he proposes a copper electrode would be employed, but so far as I can remember he does not go into the matter of electrodes.

×-*Q.* 89. I ask you to quote the language to which you refer.

A. Harmatta tells us that his process relates to "a novel method of fastening the component parts by the process of electric welding". He then goes on to define his term of electric welding, and states that he means "that well known process in which the work is brought to the welding temperature by the internal heat generated by the resistance of the work itself to the passage of the electric current at the place of contact between the parts to be joined by the welding pressure". Anyone being familiar with the prior art in which copper electrodes were employed would, I believe, assume that Harmatta's electrodes were made of the same material as was the common practice at that time.

×-*Q.* 90. Have you now pointed out all the passages in the patent that in your opinion indicate that Harmatta proposed to use copper electrodes? If not, I wish you would point out any other passage or passages that you may find supportive of your view.

A. The use of the word "electrode" to represent the tools which are pressed on the work would, to my mind, impress anyone skilled in the art at the time of Harmatta's application with the idea of copper electrodes, as the electrodes used in the art were at that time composed of copper or an alloy rich in copper.

×-*Q.* 91. You are again referring to electrodes used in clamping the work, such as are referred to in the Thomson butt welding process?

A. Yes, that is true.

×-*Q.* 92. In spot welding if electrodes of the same or higher resistance than that of the interposed plates are employed, will not welding take place between the plates if the current is led into and through them notwithstanding the heating of the electrodes?

A. Yes, this will produce a weld between the two plates, provided, however, the electrodes are not too hot and actually melt through the plates before the plates have had a chance to get internally heated.

×-*Q.* 93. In spot welding there is always a good deal of heating of the electrodes, is there not?

A. There is always a great tendency of the electrodes to heat, but the electrodes are not allowed to attain a high temperature. A cooling system is usually provided to take care of this.

×-*Q.* 94. But cooling of the electrodes would not be necessary but for the quick successive uses of the apparatus, would it be?

A. That is quite true, because the electrodes are relatively massive and the heat conducted away from the work is dispersed throughout the mass so that in ordinary spot welding one weld will not raise the electrodes to a very high temperature.

×-*Q.* 95. Is there any indication in the Harmatta patent that cooling of the electrodes is to be resorted to in any case?

A. Only in so far as he explains that his process is connected with Thomson's electric welding, in which case it was customary to cool the copper electrodes.

×-*Q.* 96. Can you say that in spot welding the heat of the electrodes, due to their contact with the plates, does not contribute to the welding of the interposed plates?

A. I think it can be safely said that the heat of the electrodes commercially used in spot welding do not influence the welding of the work, as can be readily seen from the automatic machines now on the market, where no adjustment is required for making the first weld with the electrodes cold and making the weld after the electrodes have become heated.

×-*Q.* 97. Isn't it true that as copper electrodes become heated in a spot welding machine their conductivity decreases and the resistivity increases?

A. This is theoretically true, but the electrodes in a commercial machine, due to their water circulation, are never allowed to get sufficiently heated to make any practical difference in their resistance. It is certainly true that the resistance of the electrodes does increase with an elevation in temperature, but as this temperature

is never allowed to run very high, the increase in resistance is of no practical difficulty.

×-*Q.* 98. Even though the electrodes of copper become very highly heated, you can still spot weld with them, can't you?

A. So long as the copper electrodes withstand the pressure required for the welding, they can be used for spot welding irrespective of their temperature. It is plain, however, that as the temperature of the electrodes rises the metal becomes less and less able to hold its shape under the welding pressure.

×-*Q.* 99. In an ordinary spot welding machine you can weld red hot plates, can't you?

A. Yes, provided the plates have not been allowed to oxidize to such an extent that the electricity will not flow through them.

×-*Q.* 100. If the resistance of the electrodes is higher or lower than that of the plates acted upon, or the same as that of the plates, is not the heating of the electrodes inevitable?

A. Owing to the fact that the electrodes are in contact with the heated metal and are colder than the heated metal, there is always a flow of heat from the heated metal to the cold electrodes, and unless the electrodes are cooled by some means, or radiate their heat, they will, of course, get hot.

×-*Q.* 101. In spot welding is there only one substance that will answer for electrodes? If not, what other substances will answer?

A. From a practical standpoint, copper is the only substance known to me which is satisfactory for spot welding.

×-*Q.* 102. Have you ever tried any other material for electrodes beside copper?

A. Yes; I have tried bronze.

×-*Q.* 103. Anything else?

A. I believe that is all.

×-*Q.* 104. Could you spot weld with carbon electrodes, if you employed a proper current?

A. I do not believe it would be practical to use carbon for electrodes for the electrode-spot welding of which you are speaking.

×-*Q.* 105. Why not?

A. It is quite probable that they would attain such a high temperature they would burn out the same way that a carbon filament in a lamp burns out when too much current is applied.

×-*Q.* 106. How about carbon coated with metal? Wouldn't electrodes of that material answer? If not, why not?

A. I believe that it would be very difficult to maintain a pointed electrode where the point consists simply of carbon, which would be the case where a rod of carbon of substantial size was enclosed in a tube of copper.

×-*Q.* 107. Suppose you were to take electrodes of the size and form suggested by the Harmatta patent and make them of carbon coated with metal, could you spot weld with them?

A. If the entire electrode was covered with copper of sufficient thickness to carry the current, the core of carbon would have no influence on the electrode. I assume that the electrodes are entirely covered with copper, even the parts in contact with the work. Electrodes of this nature would to all intents and purposes be copper electrodes and could be used for spot welding.

×-*Q.* 108. Could you spot weld with electrodes composed of steel; and, if not, why not?

A. Commercially speaking, no, because steel electrodes stick to the work.

×-*Q.* 109. Have you ever tried that? Or is that an assumption on your part?

A. I have never tried to commercially spot weld with steel electrodes.

×-*Q.* 110. Have you ever tried to spot weld with them at all, commercially or otherwise?

A. No, I have never tried to spot weld with steel electrodes.

×-*Q.* 111. The metal tungsten has a relatively high conductivity and low resistivity, has it not?

A. Tungsten is a poor conductor compared with copper.

×-*Q.* 112. It is a good conductor compared to carbon, is it not?

A. It is a better conductor of electricity than carbon, but offhand I do not remember its exact relation.

×-*Q.* 113. Could you spot weld with electrodes made of tungsten?

A. I believe there is a process based on the use of tungsten in which copper is welded.

×-*Q.* 114. Spot welded?

A. I believe it could be called spot welding.

×-*Q.* 115. Iridium is of higher conductivity and lower resistivity than iron, is it not?

A. I am not familiar with iridium.

×-*Q.* 116. Then you do not know whether electrodes made of iridium could be used for spot welding. Is that a fact?

A. I cannot answer regarding iridium.

×-*Q.* 117. You cannot say whether iridium would answer or not?

A. I am not familiar with the problems of iridium.

×-*Q.* 118. Assuming that in spot welding the electrodes are placed firmly against the superimposed plates with no current on and that then, while the pressure continues to be applied, current is turned on and maintained until a proper welding of the plates has been effected, and that the current and pressure are then removed, will not the aggregate thickness of the plates at the point of pressure and welding be less after the completion of the weld than before?

A. There is a slight depression at the weld which would make the aggregate thickness slightly less.

×-*Q.* 119. I take it that very slight decrease in thickness is due to the heat and pressure involved in the welding operation. Is that not so?

A. Yes.

×-*Q.* 120. What has become of that displaced metal which the heat and pressure have displaced?

A. Sometimes there is a noticeable upset around the tool which has created the pressure. The amount of depression is usually so slight that it is very difficult to say what becomes of the metal. The condition is very similar to pressing any piece of metal with a blunt tool; either the metal must be upset or condensed.

×-*Q.* 121. In ordinary spot welding is the metal softer at the contact point between plates than it is at the point of contact between the electrodes and plates?

A. In all probability, while the metal is in the hot condition the greatest heat is at the centre of the plain surface which is in the process of welding, because heat is continually flowing from this hot place to the surrounding metal, which is relatively cold. As the degree of softness is a function of the temperature, it naturally follows that the softest part of the metal would be located on the

surfaces of the sheets between the sheets at the centre of the heated spot.

×-*Q.* 122. And if there is any flowage of metal, due to compression, it ought to take place in the greatest degree where it is softest, that is to say, at the proximate faces of the plates, would it not?

A. This would be the case if the metal were not confined, but as the spot heated for welding is entirely surrounded by relatively cold metal, we can hardly think of the metal as flowing out or moving, except in so far as it is pressed strongly against itself, owing to the expansion due to the heating.

(Adjourned to Wednesday, April 24, 1918, at 10.00 A. M.)

BOSTON, MASS., May 6, 2.00 P. M.

Met pursuant by adjournment.

Counsel present as before.

Cross Examination of Mr. Church continued.

×-*Q.* 123. In spot welding is not a flat counter electrode sometimes used larger than the opposing electrode to prevent indentation and keep the work smooth on the side next the flat counter electrode?

A. The flat electrode you refer to is really used for convenience, to a great extent, that is, only one of the electrodes has to be maintained pointed. It is also true that if two very pointed electrodes be used in connection with excessive currents, there will be tool marks on both sides of the work; one of these marks can be, to a very great extent, avoided by using a flat electrode on one side.

×-*Q.* 124. In spot welding how large an area may the contacting surface of the smaller electrode have?

A. This depends on a number of things, principally on the amount of current available and on the size of weld desired. In ordinary practice it is very customary, when welding sheet metal, to give a rounded surface to the so-called pointed electrode. This would theoretically make the tool bear at but a single mathematical point, but the tool soon wears, so that in ordinary spot welding work the tip of the pointed electrode usually assumes the size of about a quarter of an inch in diameter.

X-*Q.* 125. You mean that the electrode has a bearing surface of about a quarter inch in diameter?

A. It is impossible to say what the bearing surface is at the start of the weld, as it is very difficult to make one piece of metal bear on another over an extended area, and although I meant in a previous answer the bearing surface was about a quarter of an inch in diameter, yet it is impossible to determine whether or not the total surface is in contact with the work at the start of the weld.

X-*Q.* 126. Would it be practicable to spot weld metal plates between electrodes having flat contact surfaces half an inch across?

A. I should think this would be possible provided sufficient current was forthcoming.

X-*Q.* 127. How about electrodes an inch across the contact surfaces?

A. I still believe this would be possible.

X-*Q.* 128. Is there any limit to the area of the contact surfaces of the electrodes with which spot welding may be accomplished? And, if so, please state it.

A. As long as we maintain the relative sizes of contact surface and current as implied by Harmatta's patent, I do not think there would be any definite limit to the size of the contact area of the electrodes, except those limits made by the current and pressure available.

X-*Q.* 129. What are the relative sizes of contact surface and current which you find implied in the Harmatta patent?

A. Harmatta speaks of sheet metal work similar to cooking utensils and speaks of his invention as replacing the rivets in such work. If we arrange our electrodes and our currents accordingly to obtain a weld which will replace these rivets, it will give us some idea of the size of the electrodes and the amount of current required, and therefore show us a certain relation between the size of the electrode and the amount of the current.

X-*Q.* 130. You find, however, no explicit statement in the Harmatta patent indicating what relation the size of the contact surface is to bear to the current, do you? If so, please point it out.

A. The only instructions Harmatta gives us is to experiment and obtain this data for ourselves.

X-*Q.* 131. It is apparently your view that the size of the opera-

tive contact faces of the electrodes in spot welding is not limited. I will now ask you whether in spot welding there is any limitation to the size of the spot welds produced?

A. I have not had an opportunity to go into this matter very extensively and can only give you what my opinion of the matter is. I should think theoretically that the size of the weld could be increased indefinitely, provided, however, the pressure and the amount of current could be secured so as to still hold the ratio which I have already mentioned.

×-*Q.* 132. Will you mention that ratio again, so that we may have a clear-cut expression from you on the subject?

A. As I have no notes I will give a ratio which may not be exact, but may be satisfactory for an answer. I should say that with the contacting face of one-eighth of an inch in diameter a current of 3,500 amperes would be required when welding sheets of about one thirty-second of an inch thick in two seconds.

×-*Q.* 133. What would be the voltage of this current?

A. I cannot answer that question offhand, but it would depend on the resistance of the metal between the electrodes.

×-*Q.* 134. A metal of higher resistance would require greater voltage?

A. Metal of higher resistance would require a greater voltage to force the current I have mentioned through the sheets. I have assumed in the answer to the previous question that the sheet steel was of the ordinary commercial quality. If the resistance of the sheets is increased, it in all probability would not require as much current as I have mentioned, and the same voltage on high resistance sheets would no doubt be sufficient to force enough current through the sheets to produce a weld.

×-*Q.* 135. Assuming that you are going to weld what you call sheets of sheet steel of ordinary commercial quality, using electrodes having a contact face of one-eighth of an inch in diameter with a current of 3,500 amperes, what would be the voltage required?

A. I cannot answer this question, not having any of my notes or other data with me. I might remark, however, that the voltage acoss the terminals of the electrodes would be very small, probably not over .3 volt. This is not an accurate statement, but merely my effort to answer your question.

×-*Q.* 136. If I understand you correctly, if sheets of higher resistance are attempted to be welded, the voltage of the current would have to be increased. Am I right?

A. No, you are not right. The voltage would have to be increased if you wanted to pass the same current through the sheets, but the added resistance of the sheets would generate more heat in the sheets and a current of lower amperage could be used for the spot weld, and the same voltage might be applicable in both cases.

×-*Q.* 137. You have not stated any definite law or rule which is to be followed in practicing spot welding as distinguished from other kinds of electric welding. Is there no such rule or law, or are you simply unable to state it?

A. There is no simple rule or law for calculating the current required in either spot welding or butt welding. For instance, we cannot state positively that a certain amount of current is required for a certain area to be welded. In butt welding considerable heat is lost by radiation owing to the fact that the parts heated for welding are exposed. In butt welding, also, no metal comes in contact with the parts heated for welding. In spot welding all the metal heated for welding is enclosed by relatively cold metal. This complete enclosure naturally conducts a large quantity of the energy away from the parts heated for welding. The problems of radiation can to a great extent be neglected in spot welding.

×-*Q.* 138. I didn't ask you if there was any simple rule or law regulating this matter, but if there was any rule or law at all, and to state it if you knew it. With this understanding, will you please answer the question?

A. The only rule or law which I know of in connection with problems of butt welding and spot welding is to calculate the losses of the energy supplied to the parts to be welded, then add sufficient energy to heat the work, in a given time, then knowing the resistance of the work, determine the amount of current required.

×-*Q.* 139. Does the Harmatta patent teach this rule or law which you have endeavored to formulate as the one which is to be followed in the practice of welding according to the patent?

A. In one way it does. It tells us that certain results can be obtained upon a certain class of work. The question naturally

arises in an experimenter's mind, cannot these results be obtained on thicker classes of work and on thinner classes of work, and once knowing that results can be obtained, it is the engineer's object to measure the various factors in the various classes of work to which the invention has been applied and to formulate his own methods of calculating ahead what results he may expect to obtain.

×-*Q.* 140. Will you read from the patent any passage or passages that you find there tending to support the statement you have just made?

A. I quote from the patent as follows: —

(Page 1, line 8:) "My invention relates to the manufacture of metal articles."

(Page 1, line 14:) "The invention affords a cheap and practical substitute for riveting."

(Page 1, line 17:) "It may be employed for the thinner sheet metal such for instance as is used for sheet metal wear like vessels or household utensils. In general terms the invention may be stated to consist in fastening the pieces together by an electric weld at one or more distinct or well-defined spots, each of small area or extent, in their juxtaposed or opposite plain faces by the application of pressure and heating current localized in such spots."

(Page 1, line 57:) "By the term 'electric welding' as used herein, I mean that well-known process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure."

(Page 1, line 75:) "While it is possible consistently with my invention to localize the desired pressure and heating current at the desired distinct small spot or area in various ways, this may be accomplished conveniently by pressure applied over the spot and itself localized on the back of the plate or sheet immediately over the small spot in which the union is to be made by using a tool pressed against the work by its end and formed at such end so as to engage the work by a spot or area of small extent and serving likewise by preference as the electrode which feeds the current into the work to heat the same. The member which feeds the electricity being thus at the same time the tool, in this manner the most fav-

orable conditions of working possible are secured, since as is well known in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough."

(Page 2, line 7:) "In the accompanying drawing, Fig. 1 illustrates the application of my invention to the welding of two plates or sheets overlapped so as to be superposed or have a portion only of their meeting faces presented to one another and by the welding of the opposed surfaces intermittently or at certain spots only through applying pressure at a point or spot on the back of a plate over the spot of desired union. Fig. 2 is a side elevation of a welding device also illustrated in part in Fig. 1. It shows the construction of the means which may be employed for pressing the electrode against the work by manual power. Figs. 3 and 4 show forms which may be adopted for the ends of the electrodes where they engage the work."

(Page 2, line 69:) "The time of duration of pressure and heating and the amonnt of pressure as well as the volume of current for effecting the weld can be readily determined by experiment for different sizes of thicknesses of metal and is well understood in the art of electric welding to which my invention relates."

X-*Q*. 141. Have you now quoted all the passages that you find in the patent tending to support the statement made in your answer to X-Q. 139? If not, and there are any others, I wish you would also quote them.

A. I believe that had these passages been read to me they would have been sufficient to enable me to have secured the data which I have referred to in the above answer.

X-*Q*. 142. Now, suppose the passages you have quoted had not been made, the directions upon which you rely would have been absent; where would that have left you?

A. The remaining portion of the patent still has sprinkled through it references to the illustrations and to spot welding, and no doubt by the aid of the drawings I still would have been able to understand that Harmatta claimed to make a small weld by means of passing current from the electrode *a* to the electrode *b* through the opposed meeting surfaces of the sheets, as shown in Fig. No. 1.

I no doubt would have supposed that Harmatta's Fig. No. 1 represented the arrangement of his materials in correct proportions.

×-*Q.* 143. It is your idea, then, as I understand you, that it sufficed for Harmatta to state the result that he proposed to accomplish and that by cut and try methods anyone attempting to achieve that result might arrive at the proper material of which to form the tools or electrodes, the proper amperage and voltage of current to be employed, the proper proportioning of amperage and voltage of current to the resistance of the material acted upon, and to the area of contact surface of the electrodes, and to the time of making the proposed welds, all without any further direction from Harmatta. Do I state your position correctly?

A. As I understand you, you do not state my position correctly. I can only answer your question from my own standpoint, and that is, from one skilled in the art at the time of Harmatta's invention. Should I have been handed the result of Harmatta's process, that is, two sheets which had been spot welded together, and had not been told how the results had been accomplished, it is not likely that I could have imitated the product; but if I had been told they had been electrically spot welded together by the Thomson process by means of pointed electrodes placed directly over the parts being welded, I no doubt could have finally secured Harmatta's results.

×-*Q.* 144. After a sufficient period of experimentation you mean?

A. Of course it is impossible for me to say now whether the first sample would have been spot welded or not. Surely, if I knew the results were possible and the means for securing the results, it should not have taken long to obtain the results.

×-*Q.* 145. In so-called "butt welding", what is called "extrusion of metal" and what causes it?

A. Extrusion of metal is the forcing out or upsetting of the parts heated for welding. It is caused by the parts being welded being forced together. The extrusion of metal results is what is known as a "burr".

×-*Q.* 146. This extrusion of metal is caused by the displacement of the softened metal due to heat and pressure, is it not?

A. It is due to the pressure applied to the unconfined heated parts.

×-*Q.* 147. Does not this extrusion of metal also occur, though

in less degree perhaps, in spot welding under the heat and pressure to which the metal is subjected?

A. I cannot say that there is any extruded metal in spot welding. It must be understood that the metal heated for welding in spot welding is entirely confined by relatively cold metal.

×-*Q.* 148. Can you say that there is no extrusion of metal even in the slightest degree in the case of spot welding?

A. Generally stated, there is no extruded metal in spot welding when the currents are properly proportioned to the work. In some special cases I have noted when the work has not been properly performed a slight thickening of the sheets directly around the welding electrode. This thickening is rather unusual, and I have only noted it where the processes have been carried on in an incorrect manner.

×-*Q.* 149. Is there anything said in the Harmatta patent about the extrusion of metal, or any directions given by which extrusion of metal is avoided?

A. In the Harmatta patent, page 2, lines 83 to 91, would seem to indicate to me that there was no extruded metal, as the term "extruded metal" is understood in butt welding and the previous art.

×-*Q.* 150. Do you find anything else in the patent on this subject? If so, please point it out.

A. The only other reference which I know of at the present time is that (page 1, line 14) where Harmatta says that his invention is a cheap substitute for rivets. If there had been extruded metal which had to be removed after the welding process, the process could hardly be looked upon as a cheap process and a substitute for rivets, as the removing of the "burr" or extruded metal in butt welding is quite costly as compared with the actual welding process.

×-*Q.* 151. In welding, according to the Harmatta disclosure, are not the pieces to be welded forced together with a moderate pressure; is not the electric current then passed through the proposed joint or place of union for a sufficient time to raise the parts to a welding temperature at the portions abutting, and is not the pressure then increased to complete the weld?

A. I have seen very satisfactory welding done by this method,

and I have also seen very satisfactory spot welding done by maintaining a steady pressure on the work by means of a spring.

×-*Q.* 152. I shall have to repeat my question. Please give me a direct answer to it.

A. In answering your question I will say that spot welding can be done by the method you describe, but it is also possible to secure satisfactory spot welds by maintaining a constant pressure on the work by means of a spring or other means.

×-*Q.* 153. Does Harmatta suggest the use of a spring?

A. Harmatta tells us various means of applying pressure (page 1, line 98, to page 2, line 6). In one case he says the pressure may be applied by hand; in which case it is quite possible, and even probable, that a constant pressure would be applied to the operating mechanism acting for all intents and purposes as a spring, like many of the semi-automatic welders used for butt welding.

×-*Q.* 154. Does not the description of the practice of the Harmatta disclosure set forth in X-Q. 151 accurately describe the butt welding process of Thomson?

A. Yes, this is true, but at the time of Harmatta's invention there were many butt welding machines operating simply by means of weights or springs, which also would be a correct description of Thomson's process. The point I want to bring out is that your description is correct, but that other descriptions would also be correct.

×-*Q.* 155. Where there are two plates to be welded together, and one is placed upon a suitable support and has the current led to it at a point remote from the place of proposed weld, and the other is pressed firmly against the first plate by a current-carrying electrode applied over the place of proposed weld, is that spot welding in the sense of the Harmatta disclosure?

A. The large electrode which you speak of would be uniformly charged, irrespective of where the conductor was connected to it, and a spot weld, produced by means of this block and a pointed electrode, I would say, was spot welding, irrespective of the position where the conductor supplying the current to this block was located. I understood, from this question, that the support of which you speak was a conductor, and that the wire leading to it was connected to it at a place remote from the spot to be welded.

Assuming that the support is a non-conductor, and that the lower sheet is connected at some remote point with one of the electrodes, and a pointed electrode placed on the top of the other sheet, resulting in a weld between the two sheets under the pointed electrode, I would call this a spot weld.

×-*Q*. 156. It is not, then, necessary to employ two opposed electrodes, that are independent of the work, in order to spot weld. Am I right about this?

A. I assume, from your previous question, that welding was possible and I would call a weld produced by means of a process which has the characteristics of that which I have previously mentioned a spot weld. Provided the current and the pressure were localized at a spot, producing a weld at this spot, I would still call it a spot weld, irrespective of what other means than two oppositely opposed electrodes, directly over the weld, were employed.

×-*Q*. 157. What do you understand to be the form of electrode shown in Fig. 3 of the Harmatta patent?

A. I would consider these rods with concaved, opposing surfaces, so that each electrode bore on the work by means of two restricted areas.

×-*Q*. 158. Do you regard the end of each of the rods shown in Fig. 3 as simply bifurcated, or as concaved, or hollowed out?

A. Bifurcated.

×-*Q*. 159. How would electrodes shown in Fig. 3 of the patent perform, if used in place of the electrodes shown in Fig. 1 of the patent?

A. I have never used electrodes of this type, but it is my view of the matter that, under careful conditions, two independent welds might be produced. It is also my opinion that it would be a very difficult tool to keep in proper shape, in spot welding.

×-*Q*. 160. Wouldn't such tools be liable to produce extrusion of metal?

A. I have not had sufficient experience with a tool of this type to answer your question definitely.

(Adjourned to Tuesday, May 7, 1918, 9.30 A. M.)

BOSTON, MASS., May 7, 1918, 9.30 A. M.

Met pursuant to adjournment.

Counsel present as before.

×-*Q.* 161. If instead of utilizing the bifurcated or grooved form of electrodes shown in Fig. 3 of the Harmatta patent to heat and clamp sheets of metal until raised to a welding temperature you should cause such electrodes to clamp a metal rivet blank fitting the bifurcations or grooves, you could thus by turning on the current heat and soften such rivet blank, could you not?

A. Yes.

×-*Q.* 162. What would cause the rivet blank to be softened in the case I have supposed?

A. The concentration of the electricity by having to pass through the relatively small cross-section of the rivet blank.

×-*Q.* 163. Might not this use of the electrodes shown in Fig. 3 of the Harmatta patent have been in contemplation by Harmatta in the absence of any explanation in the patent to the contrary?

A. Of course it is impossible for me to know what was in Harmatta's mind, and without trying in any way to interpret Harmatta's patent, it is my opinion that Fig. 3 of Harmatta's patent certainly does not show setting tools for electric riveting. I say this because in electric riveting cupped-shaped terminals must be used in order to properly seat themselves on the heads of the rivets and also to form a satisfactory head on the straight shank. The terminals shown in Fig. 3 of Harmatta's patent are not cupped-shaped, but can be looked at as a blunt rod on which two projections or teeth have been formed, that is, the terminals are not cupped-shaped. In case the rivet was placed at right angles to the plane of the electrodes, so that the current was passed transversely through the rivet, I should also think Fig. 3 would indicate that the heating of the rivets was not in Harmatta's mind, because the groove formed by the welding tools is of an angular shape, and it seems to me these grooves would have been made round in conformity to the shape of a rivet, which seems to me is always thought of as a round body.

×-*Q.* 164. The truth is, however, that the form of electrodes shown in Fig. 3 of the Harmatta patent might be utilized for the softening of interposed metal sheets in order to weld them, or the

softening of material like a metal rivet interposed between them. Is this not so?

A. If you mean the softening of metal under these terminals shown in Fig. 3, so that after the metal has become sufficiently heated to be transferred to another set of electrodes for welding, I should say that I do not see how this could have been in Harmatta's mind, because the metal on thin sheets, as Harmatta speaks of, cools off so quickly that I do not see, even if the metal was heated for welding, how it could have been subsequently welded, still maintaining the heat produced by the electrodes, as shown in Fig. 3. As for softening a rivet, I still think if Harmatta had had this in mind, the terminals would have been of a different shape. Whether or not the electrodes shown in Fig. 3 could be used for the purposes you mention, I have not had an opportunity to experiment and therefore I cannot answer definitely. I should think, however, that certain modifications would be necessary before they could be used advantageously on commercial work.

×-*Q.* 165. I show you a patent to Blanchard No. 466,266, dated December 29, 1891, for electric heating tools. I call your attention to the fact that the appliance of this patent is stated to be used primarily for heating rivets by electric current. If you were to interpose overlapped or superposed thin sheets of metal between the copper electrode *b b* of this Blanchard appliance, could you not also spot weld with it?

A. Blanchard's patent No. 466,266 shows an apparatus for heating rivets. The rivets which this machine has to do with are those which are heated for upsetting. Small rivets are upset cold; therefore, the rivets shown in Fig. 1 are large rivets—I should say at least three-eighths of an inch in diameter. In order to heat rivets of this kind along their whole length, the rivet would have to be grasped nearly along its whole length as shown. These blocks that grasp the rivet are secured to the ends of two conductors, which are much smaller in cross-section than the blocks.

If, now, these blocks were made to bear on superimposed thicknesses of metal, it is quite plainly indicated that the current is diffused by the blocks instead of being concentrated as is one of the characteristics of the Harmatta process, and although by careful manipulation a spot weld might be produced as a feat, the appara-

tus certainly would be of little use commercially for the spot welding purpose. The apparatus is connected to the source of power C by means of cables, which must be long enough to move the rivet from one point to another, and therefore these cables must be flexible, and as the apparatus is operated by hand, the cables must be light, and although, as I have stated, a spot weld might be produced as a feat, it is a question whether any weld would be produced with this apparatus. It should be noticed that the electrodes which pass the current through the work have a bearing on the surface of the work larger than any other cross-section of the circuit shown. The electrodes therefore do not concentrate the current as it passes through the work.

×-*Q.* 166. Would the disclosure of this Blanchard patent teach you how to electrically heat and soften metallic rivets?

A. Personally I do not believe that it would, because I do not think the apparatus as disclosed would be a satisfactory means of doing this.

×-*Q.* 167. Do the considerations of the flexibility of the conductors, or of the cross-section of the conductors, or of the electrodes shown in the drawings of this patent enter into the reasons for the conclusions you have stated in regard to the practicability of this Blanchard device.

By Mr. STACKPOLE. All questions in regard to this Blanchard patent are objected to as outside of the direct examination.

A. The reasons for my conclusions in regard to this matter are that I do not think that the whole principle utilized in this invention for heating rivets is a practical one, and I believe that if one skilled in the art, or otherwise, would try to follow the inventor's ideas, it would not be conducive to practical results.

×-*Q.* 168. Do you mean by that that rivets could not be heated and softened as proposed by Blanchard?

A. I have had no opportunity to try out experiments along these lines, but my opinion is that from at least a commercial standpoint rivets could not be heated according to Blanchard's process. I say this because according to Blanchard the current must be kept on quite a length of time in order to heat the rivets, and in keeping he current on for this time the whole apparatus would become

unduly heated, not only from the heat generated within the metal of the apparatus due to its own resistance, but it is clear that so much metal lying in contact with the heated rivet would conduct enormous amounts of energy away from the rivet, and the clamp blocks would become very heated.

×-*Q.* 169. I show you now a patent to Charles N. Coffin, No. 437,571, dated September 30, 1890, for "Process of Electrically Welding Metal", and calling your attention particularly to the modification of apparatus shown in Fig. 5 and to the description thereof in the specification, I ask you whether you think that that apparatus is also inoperative to produce electric welding?

By Mr. STACKPOLE. Objected to as without the scope of the direct examination.

A. This apparatus consists of mechanism for pressing carbon blocks at the points to be welded. According to lines 43–54 of page 1, the articles to be welded are heated at their point of contact between the carbon block and the work. I would not say that this patent was entirely inoperative, but I have never seen the invention as shown here come into use on commercial work.

×-*Q.* 170. Do you regard the form of electrodes shown in Fig. 4 of the Harmatta patent as in any essential respect different from the form shown in Fig. 3, or from the form shown in Fig. 1 of the patent?

A. I have never experimented to determine the differences between electrodes shown in Figs. 1, 3 and 4. I consider, offhand, that Figures 1 and 4 show electrodes which give practically the same results. Figure No. 3 I believe would be difficult to maintain in practice.

×-*Q.* 171. But still you think you could spot weld with electrodes shown in Fig. 3, don't you?

A. I believe that spot welding can be done with electrodes shown in Fig. 3.

×-*Q.* 172. Suppose you introduced into an otherwise competent apparatus electrodes like those shown in Fig. 4, for instance, and shifted the work, or shifted the electrodes laterally with respect to the work while pressure and current were maintained; would the result be spot welding?

A. I would call this "line" welding. It would have many of the characteristics of the Harmatta process.

×-*Q.* 173. If the line of welding produced were a quarter of an inch long, it would be spot welding, wouldn't it?

A. As long as the work moved in relation to the tools I would call it line welding irrespective of how long that line was.

×-*Q.* 174. Question repeated.

A. I can only answer my views of the matter, which are that I would call it "line" welding as long as the work moved in relation to the tool.

×-*Q.* 175. But would that so-called "line welding" also be "spot welding" according to your definition of spot welding heretofore given in this case?

A. In many of the characteristics it would, but when the work is moving in relation to the tool it will be noted that the work having passed under the tool still remains heated for an appreciable length of time; therefore the metal being welded is not entirely surrounded by relatively cold metal.

×-*Q.* 176. Question repeated.

A. In my definition of spot welding, I have said that the metal heated for welding is entirely surrounded by relatively cold metal. When the work is moved in relation to the terminals during the welding, that part of the metal which has been under the electrodes and is slightly removed so as to allow other metal to take its place and be heated for welding, still remains hot, so that now the metal being heated for welding is not entirely surrounded by relatively cold metal, being bounded on one side by the metal which has already been heated and welded. There, therefore, is a difference between line welding and spot welding. That is, they differ in this one characteristic at least.

×-*Q.* 177. Am I to understand you to say that the line welding, such as would take place under the conditions set out in X-Q. 172 would not be spot welding? Please answer yes or no.

By Mr. Stackpole. The witness is reminded that he need not answer the question yes or no, if the question does not permit of such an answer, and that he is entitled to explain any answer that he may give.

A. I cannot answer yes or no without danger of misleading those who would read my answer. It is evident that if the metal was only moved .001 of an inch in relation to the tools, the product would to all intents and purposes appear as a spot weld, yet if the movement was continued for several inches, it would plainly show on the product as a line weld.

×-*Q.* 178. A line weld may therefore be a spot weld or not according to its length. Do I understand you correctly?

A. No, you do not. I would call a weld, irrespective of its shape, a spot weld if the process producing that weld had the characteristics which I have previously mentioned. I would call a weld a line weld if the terminals making that weld moved in relation to the work, or the weld was made progressively irrespective of its length.

×-*Q.* 179. When does a line weld become a spot weld?

A. According to my ideas, a line weld cannot become a spot weld.

×-*Q.* 180. When does a spot weld become a line weld?

A. I cannot imagine a spot weld becoming a line weld.

×-*Q.* 181. I am going to ask you to again state as clearly as you may the distinguishing difference between what you call a line weld and a spot weld?

A. A line weld and a spot weld have many characteristics in common. I would call a spot weld one where the work did not move transversely in relation to the electrodes making it. I would call a line weld one in which the work moved transversely in relation to the centre line of the electrodes.

×-*Q.* 182. Do you wish to be understood as abandoning or as including in your definition of spot welding the point that the metal being heated for welding is entirely surrounded by relatively cold metal?

A. In spot welding the metal heated for welding is entirely surrounded by relatively cold metal. That is my understanding of one of the characteristics of the spot welding process.

×-*Q.* 183. What do you mean by relatively cold metal? How much difference in temperature must there be between the metal at the point of welding and the metal that surrounds the metal at the point of welding? The term "relatively cold" seems to be very indefinite.

A. There is, of course, no distinct boundaries between cold metal and hot metal. For the sake of argument, I will say that I mean, by cold metal, metal which conducts the heat away rapidly, and by hot metal, metal which owing to its temperature does not conduct the heat away rapidly.

×-*Q.* 184. Would you draw the line between metal that is in a plastic, fusible and welding state and metal that is not in that condition, calling the first named "hot metal" and the last named "relatively cold metal"?

A. No, I would not do this. I would rather have as my dividing line metal heated above a red heat, as representing what I mean by hot metal, and metal below a red heat as that representing cold metal.

×-*Q.* 185. In ordinary spot welding operations with electrodes having a bearing surface of, say, a quarter of an inch across, how long does it take to make a spot weld?

A. This will depend on the thickness and quality of the work and on the current used. I cannot answer your question without knowing these things.

×-*Q.* 186. How rapidly have you ever seen welds made with electrodes having contact faces of the dimensions stated in my last question.

A. About two welds a second.

×-*Q.* 187. In other words, a weld every half second?

A. Yes, sir.

×-*Q.* 188. And yet, if I understand you, a succession of welds a quarter of an inch in diameter made to overlap one another at the rate of a weld each half second would be spot welding. Am I not right in this?

A. You are right if you understand what I have said that I would call such an operation spot welding in so far as it agrees with the characteristics of spot welding which I have given.

×-*Q.* 189. And would it be spot welding if the successive welds were overlapped upon their predecessors while the latter were above a red heat?

A. I would call it spot welding in so far as it agrees with my enumeration of the characteristics of spot welding.

×-*Q.* 190. In the case as last put, would each of the welds be

entirely surrounded at the time of welding by relatively cold metal according to your definition?

A. I cannot answer this question as intelligently as what I would like, as I have not experimented with this question in mind. My opinion, however, is that in the thin sheet metal the metal will cool off so rapidly that one weld will be below a red heat before the other weld is made. This, of course, would not be true when the work consisted of heavy plates, say three-eighths of an inch in diameter.

×-*Q.* 191. If instead of the pointed, or rounded, or bifurcated electrodes shown in the Harmatta patent, electrodes consisting of rollers were employed, could you spot weld with them; and, if so, under what conditions?

A. I believe a spot weld could be made with rolls as electrodes provided they were made to bear at a small area on the work; of course, provided that proper apparatus and sufficient current was employed.

×-*Q.* 192. Have you ever made spot welds with roller electrodes?

A. I never remember having made spot welds with roller electrodes.

×-*Q.* 193. Did you ever see a spot weld made with or that had been made with roller electrodes?

A. I do not recall any such weld.

×-*Q.* 194. Did you ever try to spot weld with roller electrodes?

A. I never did.

×-*Q.* 195. Did you ever try to make what you call a line weld with roller electrodes in an electric welding machine?

A. I do not remember ever having made a line weld or trying to make a line weld with roller electrodes.

×-*Q.* 196. Did you ever operate or see operated an electric welding machine employing roller electrodes?

A. Yes; I have built and operated machines for lap seam welding and butt seam welding by means of roller electrodes.

×-*Q.* 197. What were the rollers made of?

A. The rolls were made of copper.

×-*Q.* 198. What was their diameter and the width of their contact surfaces?

A. I will tell you the best I can from memory, as it has been a

long time since these matters have been in my mind. One set of rolls I have in mind were about ten inches in diameter. The bearing face was approximately two inches in width. These were used for butt seamed welding tubes approximately two and one-eighth inches in diameter. Another set I remember were about two feet in diameter and had a bearing surface of about one inch wide. These were also used for butt seamed welding tubes of two and one-eighth inches in diameter. Another set I recall were about six inches in diameter, with flat faces about one inch wide. These were for lapped seamed welding sheets together.

×-*Q.* 199. If in the apparatus shown in the Harmatta patent roller electrodes were employed and caused to act upon successive and separated spots on the overlapped or superposed sheets, spot welding would result, would it not?

A. If these rolls were constructed so as to take the place of Harmatta's electrodes, I believe a spot weld could be secured.

×-*Q.* 200. Suppose the roller electrodes were narrow and had a rounded contact surface, they would spot weld if they were brought successively against the superposed plates at intervals, or remote points, but they would not spot weld if they were kept in contact with plates while the plates were pulled through between them. Do I state the matter fairly?

A. I have had no experience in using rolls for spot welding or in making line welds, and can only tell you what I believe will result. I believe if the rolls were simply given an up and down motion and properly shaped, they would afford crude means for obtaining a spot weld. If, however, the rolls were clamped tight against the work, and the work moved through the rolls, I believe a line weld could be secured.

×-*Q.* 201. And that the line weld to which you refer would not be a spot weld?

A. According to my idea of the two processes, the processes for securing the weld would be distinguished as line welding and spot welding.

×-*Q.* 202. What definite statement is there in the Harmatta patent indicating that the Harmatta process is to be used for the production of sheet metal ware like vessels or household utensils?

A. I should say in lines 14 to 21, page 1.

X-*Q*. 203. Is there any other statement in the patent to that effect?

A. It refers throughout the patent to sheet metal, and as household utensils are made of sheet metal, it may be here also he refers to the subject you have in mind.

X-*Q*. 204. Is there any other statement except in the portions of the patent you have definitely referred to?

A. I believe that is the only place he refers to household utensils.

X-*Q*. 205. What definite statement is there in the patent to the effect that the spot or spots welded are surrounded by comparatively large areas of opposed surfaces in which no weld is made?

A. In order to distinguish Harmatta's welds from other welds and to give a good idea of what he is talking about, he refers to this matter from lines 47, page 1, to 56, page 1.

X-*Q*. 206. Anywhere else?

A. What I have noted is the only reference distinctly indicative outside of the claims.

X-*Q*. 207. What statement is there in the Harmatta patent to indicate that the parts to be united are to be welded only by heat developed by the resistance of the plates themselves to the passage of the electric current?

A. His statement that his process relates to the Thomson welding would indicate this to me.

X-*Q*. 208. Where in the patent is this pointed out?

A. He says his invention relates to electric welding, lines 5–7, page 1. He then describes what he means by electric welding, lines 57–64, page 1.

X-*Q*. 209. Have you now pointed out all the passages in the patent, exclusive of the claims, indicating that the resistance of the plates themselves is relied upon to develop the requisite welding heat?

A. In connection with his statements which I have already related, his statement that the flow of heating current is passed through the work (lines 50–51, page 2) would to me corroborate the statements which I have pointed out.

X-*Q*. 210. You do not regard the statements which you have pointed out in response to X-Q. 201 and succeeding questions as necessary to the disclosure of what you call "spot welding", do

you? In other words, all the statements to which you have referred might be eliminated from the patent and there would be left an adequate disclosure of spot welding, would there not?

A. I believe there is still sufficient matter left in the patent to guide me at the time of Harmatta's invention to still realize the general character of his invention.

(Recess).

×-*Q.* 211. On pages 4 and 5 [printed page 30] of your direct examination you stated that in the year 1910 you entered the employment of the Hale & Kilburn Company of Philadelphia as "engineer on electric welding", and entered upon a two years' study of the properties of the welding circuit; that you made investigations on original lines assisted by your cousin, who helped you materially on the difficult mathematics of the subject; that you found your calculations for butt welding were fairly correct, but were of no value in calculating the welding circuit for spot welding, for the reasons, first, that the current used for spot welding was comparatively large, and secondly, because the heat losses in spot welding had to be treated very diffferently from those in an ordinary circuit. I ask you if there is anything said in the Harmatta patent about the use of currents comparatively large or about heat losses? If so, please point it out.

A. There is nothing distinctly stated in the Harmatta patent regarding these things, but they would be soon discovered or brought to the attention of the experimenter on carrying out Harmatta's instructions of adjusting the currents, etc., as indicated in Harmatta's patent, lines 69–76, page 2.

×-*Q.* 212. On page 6 [printed page 31] of your direct examination you say that the Harmatta process is intended to be used on superposed metal sheets to replace riveting without changing the work in any way. Is there anything said in the Harmatta patent about the method of patent not changing the work in any way?

A. Nothing except he refers to his process as replacing riveting, and from the general disclosures of the patent, especially the disclosure of Figure No. 1.

×-*Q.* 213. In your direct examination you speak of the pressure on the tools described by Harmatta as being the same as in riveting. Is there anything said in the patent about this?

A. There is no comparison of this nature in the patent itself except what might be culled from the general description of the patent and the disclosure of Figure No. 1.

×-*Q*. 214. On page 7 [printed page 31] of your examination you speak of Harmatta's use of tapered or pointed electrodes. Do you regard the use of such electrodes as necessary or only desirable in the practice of the Harmatta method?

A. The actual contact between the tool and the work in the Harmatta process should be over a restricted area, and a pointed terminal seems to me would be the easiest and most satisfactory method of securing this condition.

×-*Q*. 215. On page 7 [printed page 31] of your direct examination you speak of the heated soft metal being confined by the relatively cold metal about it. Is there anything said about this in the Harmatta patent?

A. No direct statement regarding this matter I believe is contained in the Harmatta patent, but it surely is implied by a number of statements therein contained.

×-*Q*. 216. On the same page of your direct examination you also say that the soft metal cannot extrude. Do you find anything in the patent about the extrusion or non-extrusion of metal?

A. There is no direct statement regarding this matter, but it is certainly implied by Harmatta's description.

×-*Q*. 217. On page 7 [printed page 31] of your direct examination you also say "the current is then interrupted and the tools removed from the superposed sheet". Is there any statement in the patent to the effect that the current is interrupted before the tools are removed from the superposed sheets? If so, please point it out.

A. It is not said directly that the current is interrupted only in so far as the patent refers to the Thomson process of welding, where it was customary to interrupt the current before the work was taken out of the welding machine. I also believe that lines 69–76 refer to this.

×-*Q*. 218. On the same page of your direct examination you say the heated spot cools almost instantly, due to the masses of cold metal surrounding it. Is there anything said in the patent about this instant cooling of the metal?

A. There is no direct reference to this matter, but as Harmatta does not tell us to wait until the metal cools off before removing it from the terminals, I believe this is implied. (See lines 77–82, p. 2.)

×-*Q*. 219. On page 8 [printed page 32] you say that the heat marks of the completed weld show that the current has been confined to a restricted area as it passed through the work. Is there anything in the patent about heat marks?

A. I do not believe that the patent refers to heat marks.

×-*Q*. 220. On the same page you say that the Harmatta process "entirely dispenses with clamps and rollers and is commercially very inexpensive, as no preparation for the work is required and no dressing or finishing of the weld is necessary after the welding has been completed". Is there anything in the patent about this?

A. These direct statements are not made in the patent, but as the process is to take the place of riveting, and has taken the place of riveting, it must necessarily be a very cheap process. Harmatta certainly implies, lines 83–91, page 2, that the finished work is comparatively clean, leaving nothing behind that is objectionable, not even metal like the head of a rivet.

×-*Q*. 221. On page 10 [printed page 33] of your direct examination, in attempting to describe the defendant's machine you lay stress upon the fact that its tapered electrodes are of good conductivity. Is there anything said in the Harmatta patent about the use of electrodes of good conductivity?

A. Only in so far as Harmatta classes his invention under the head of the Thomson process, where electrodes of good conductivity are used. He also speaks of this process of generating the heat within the work itself, which to my mind would indicate that the electrodes must be of good conductivity.

×-*Q*. 222. In the suit of *Thomson Electric Welding Company* v. *Barney & Berry, Inc.*, upon the Harmatta patent here involved were you identified in interest with the plaintiff or with the defendant?

A. I assisted the Thomson Electric Welding Company, which was the plaintiff.

×-*Q*. 223. In the interference case now pending between the Harmatta patent and the application of Sebastian Ziani DeFerranti

Interference 36,709, did you not on April 13, 1916, appear as a witness for the plaintiff here, the owner of the Harmatta patent?

A. I did, but I cannot remember whether this is the exact date or not. I was called in this interference case by Townsend & Decker, New York.

×-*Q.* 224. You are familiar with an organization known as the Welding Patents Investigating Committee, are you not?

A. I am.

×-*Q.* 225. One of the purposes of that committee is to collect evidence with which to resist the demands of the owners of the Harmatta patent in suit, is it not?

A. I believe so. I believe one of its objects is for that purpose.

×-*Q.* 226. And you understand, do you not, that that committee was and is engaged in the collection of materials of defence for use in any suit that might be brought against any of its members under the Harmatta patent, do you not?

A. I believe that is right.

×-*Q.* 227. Did you at any time attend any of the meetings of this committee; and, if so, where and when?

A. I remember having attended one of the meetings at Canton. I believe this was the first meeting of the committee. I attended another meeting in Cleveland.

×-*Q.* 228. For what concern did you purport to be a representative at these meetings?

A. The American Chemical Paint Company of Philadelphia.

×-*Q.* 229. Did not the American Chemical Paint Company become a contributing member of the committee and pay the several assessments that were required of it in order to carry on the work of the committee?

A. It did.

×-*Q.* 230. What was the basis upon which those assessments were levied, and how much did your company pay?

A. I do not remember how much the company paid, but I remember we paid all the assessments as they became due. The assessments were based on the number of welding machines which the contributors possessed.

×-*Q.* 231. Did the American Chemical Paint Company possess

at that time one or more spot welders; and, if so, for what purpose was it or them used by it?

A. The American Chemical Paint Company had at its works a large welding machine which was designed and built by me. Mr. Tilghman and myself, who are really the American Chemical Paint Company, thought very seriously of going into the electric welding business. Mr. Tilghman, however, and also myself were uncertain as to what might develop regarding the electric welding patents, and it was finally decided to wait for the outcome of the future, and so the welding machine was not put in operation.

×-*Q.* 232. Did your company have but one welding machine?

A. We had but one welding machine.

×-*Q.* 233. And you contributed to the committee on the basis of one welding machine, did you not?

A. Yes.

×-*Q.* 234. During the time of the adherence of the American Chemical Paint Company to this committee you were at different periods the secretary and president of that company, were you not?

A. Yes.

×-*Q.* 235. You were also at the same time under a retainer from the plaintiff or identified in interest with the plaintiff in this case, were you not?

A. I was only employed by the plaintiff during the time the Barney & Berry case was appealed and for a short time during the pending of the DeFerranti interference. It was not until about a year ago that I was continuously retained by the plaintiff.

×-*Q.* 236. Your object in joining with the Welding Patents Investigating Committee and in contributing to its funds was not for the purpose of furthering the work of that committee but for the purpose of spying upon its operations and furnishing information to the plaintiff in this suit, was it not?

A. I do not think you have put this in a very good way. I was on what you might say both sides at the same time. When my company joined the Welding Patents Investigating Committee I was not under a retainer by the plaintiff, and as soon as I felt that I could be looked at as a spy I had the secretary of the American Chemical Paint Company write Mr. Milligan, the leader of the Patents Investigating Committee, a letter setting forth my position

and the position of our company, and requesting them to advise the American Chemical Paint Company if they thought under the circumstances the American Chemical Paint Company should resign from the committee. Mr. Milligan wrote back saying that he did not think this was necessary.

×-*Q.* 237. I show you a copy of a letter, dated February 28, 1917, addressed to Mr. J. H. Gravell, American Chemical Paint Company, Philadelphia, and ask you to state if you received from Mr. H. C. Milligan, chairman of Welding Patents Investigating Committee, the original of which this letter is a copy?

A. I believe I recall the receipt of this letter.

(Letter marked for identification "Defendant's Exhibit A-1".)

×-*Q.* 238. I also show you a letter, dated March 2, 1917, directed to the Welding Patents Investigating Committee, and signed "American Chemical Paint Company, J. H. Gravell", and ask if that is a letter which you dictated and signed?

A. That is the letter.

(Letter marked for identification "Defendant's Exhibit A-2".)

×-*Q.* 239. I also show you a letter, dated March 9, 1917, addressed to Mr. H. C. Milligan, chairman, and signed "American Chemical Paint Company, B. C. Tilghman, President", and ask you if you did not dictate that letter, and if the initials "J. H. G." in the lower left-hand corner do not so indicate?

A. I do not remember having dictated this letter, but no doubt did, as my initials appear upon it.

(Letter marked for identification "Defendant's Exhibit A-3".)

×-*Q.* 240. I also show you a copy of a letter, dated March 12, 1917, directed to Mr. B. C. Tilghman, president American Chemical Paint Company, Philadelphia, Pa., acknowledging receipt of a contribution of ten dollars to the cause of the Welding Patents Investigating Committee, and ask you if such a letter was not received by American Chemical Paint Company from Mr. H. C. Milligan, chairman?

A. I have no reason to doubt that this letter is authentic.

(Letter marked for identification "Defendant's Exhibit A-4".)

×-*Q.* 241. I also show you another letter, dated May 22, 1917,

addressed to Welding Patents Investigating Committee, and signed "American Chemical Paint Company, B. C. Tilghman, President", stating that a check is enclosed for twenty dollars, and ask you if this was not a letter forwarding a contribution made by your company to the investigations being carried on by that committee?

A. I believe that it was.

(Letter marked for identification "Defendant's Exhibit A-5".)

×-*Q.* 242. I also draw your attention to a copy of a letter, dated May 28, 1917, addressed to American Chemical Paint Company, acknowledging receipt of twenty dollars, and expressing appreciation of the hearty co-operation of American Chemical Paint Company in the committee's work, and ask you if such a letter as that was not received by American Chemical Paint Company from the committee?

A. I have every reason to believe that it was.

(Letter marked for identification "Defendant's Exhibit A-6".)

×-*Q.* 243. I also draw your attention to a letter of October 22, 1917, addressed to the Welding Patents Investigating Committee and signed "American Chemical Paint Company, F. H. Schukraft," and ask you who F. H. Schukraft is, and if such a communication was not sent out by American Chemical Paint Company?

A. F. H. Schukraft is the stenographer for the American Chemical Paint Company and I have no reason to doubt that this letter was sent.

(Letter marked for identification "Defendant's Exhibit A-7".)

×-*Q.* 244. Mr. Gravell, while you and your company, American Chemical Paint Company, were thus ostensibly operating and working with and in the interest of the Welding Patents Investigating Committee, did you not at Canton, Ohio, in the office of Mr. H. C. Milligan, chairman of that committee, state to Mr. Milligan that you had helped win the suit on the Harmatta patent against Barney & Berry, Inc.?

A. I do not remember exactly what I said, but probably I said this.

×-*Q.* 245. Did you not at the same time and place state to Mr. Milligan that you had information or knowledge that would enable

the Harmatta patent to be defeated, or words to that purport or effect?

A. I do not remember ever having made such a statement to Mr. Milligan. I probably said, as I did to Mr. Carrick at one time, that if they really had disclosures showing the Harmatta patent to be worthless, I could arrange matters in such a way that their suit could be won.

×-*Q.* 246. Do you deny making to Mr. Milligan a statement in substance or effect like that mentioned in my last question?

A. I am quite sure I did not state to Mr. Milligan that I had information which would invalidate the Harmatta patent.

×-*Q.* 247. And did not Mr. Milligan at the time and place before stated ask you what your information was and didn't you ask him what it would be worth to him to have it, or words to that purport or effect?

A. I may have mentioned in a conversation that I would not go into the matter without a compensation and would like to know what was offered, or some words to that effect.

×-*Q.* 248. Did Mr. Milligan at the time and place mentioned offer you anything for your information?

A. Mr. Milligan did not offer me any inducement and, in fact, talked in such a way regarding the original suit and its appeal, saying that it was a prearranged affair, that I remember that I got very mad, and for that reason I do not recall everything I said and everything that Mr. Milligan said.

×-*Q.* 249. When in August or September, 1917, the Federal Welder Company had taken over the plant of the National Electric Welder Company of Warren, Ohio, didn't you or your company, American Chemical Paint Company, endeavor to secure some of the shares of stock or bonds of the Federal Machine & Welder Company and was not your offer refused?

A. Yes.

×-*Q.* 250. Please examine the letter I now show you, dated September 1, 1917, addressed to the Federal Machine & Welder Company and signed "American Chemical Paint Company, F. H. Schukraft", tendering a subscription of two hundred and fifty dollars and enclosing check for ten dollars, being ten per cent of

the subscribed stock, and ask you if such a letter was not written and sent by your company?

A. I believe that it was. I am not sure but that I did not dictate that letter.

(Letter marked for identification "Defendant's Exhibit A-8".)

×-*Q.* 251. Please examine copy of a letter, dated September 5, 1917, addressed to American Chemical Paint Company, and state if the original of this letter was not received by your company from Mr. Ralph Lounsbury, chairman of the Committee of Organization of the Federal Machine & Welder Company?

A. I believe that such a letter was received.

(Letter marked for identification "Defendant's Exhibit A-9".)

×-*Q.* 252. At the time of this attempted subscription to the stock and bonds of the Federal Machine & Welder Company by your company, you were retained by the plaintiff in this suit, were you not?

A. Yes, I believe I was.

×-*Q.* 253. During your direct examination you produced a sample of so-called spot welding, which you testified you had personally welded on one of the welding machines at the defendant's plant on January 9, 1918, the said sample being marked "Plaintiff's Exhibit No. 7, Gravell Specimen of Ford Welding". I now ask you how and under what circumstances you obtained access to the welding machine at the Ford plant to enable you to perform this work?

A. I went to the Ford Company and asked if they ever allowed people to go through their works. They replied that they did. A guide took me through the works, and among many other things showed me some spot welding machines. I picked up two scraps of steel and placed them between the terminals of a welding machine and operated the machine twice to produce the sample. The guide told me to take it with me as a sample of spot welding.

×-*Q.* 254. Did you ask permission of the guide to do this work?

A. I believe I made the remark such as "I wonder if I can operate that spot welding machine", and if my memory serves me correctly both the guide and myself operated the machine. I do not remember having said to the guide "May I spot weld on this machine?"

×-*Q.* 255. Did you ask the workman in charge of this spot welding machine to permit you to do this piece of spot welding?

A. I do not remember having any conversation with any of the workmen in the plant.

×-*Q.* 256. Was there a workman present at the spot welding machine upon which you performed this operation of welding?

A. I do not remember that there was a workman working at this machine on which I did this spot welding just prior to my trying it, but I believe the machine felt warm as if it had been used recently. My memory on this point is a little hazy.

×-*Q.* 257. Upon what product or article was this particular machine being used judging from the nature of the articles about it that had been or were about to be spot welded?

A. I saw so many welding machines in so many departments and as my trip was necessarily hurried, I may be mistaken, but I think the department was that in which the products of a nature shown in Plaintiff's Exhibit No. 2 were manufactured, that is, parts of mufflers.

×-*Q.* 258. Did you see any of the mufflers made and spot welded while you were in the factory?

A. I remember having seen the mufflers, but I do not remember having seen them spot welded, as it was rather late in the afternoon when I went through the factory.

×-*Q.* 259. Did you procure the muffler Plaintiff's Exhibit No. 2, and deliver it to plaintiff or plaintiff's counsel?

A. No, I did not.

×-*Q.* 260. Do you know where it came from?

A. No.

×-*Q.* 261. Are we to understand that, on the occasion of doing this spot welding on Plaintiff's Exhibit No. 7, you picked up from the floor flat pieces of sheet steel and subjected them to the action of one of defendant's welding machines to produce the welds, and then carried the specimen off with you and offered it in evidence in connection with your testimony in this case?

A. Yes.

×-*Q.* 262. Was your name recorded as a visitor when you visited the Ford plant on this occasion?

A. A name was recorded; that is, I used an assumed name.

District Court of the United States, Eastern District of Michigan, Southern Division. In Equity.

THOMSON SPOT WELDER COMPANY, Plaintiff,
vs.
FORD MOTOR COMPANY, Defendant.

On Harmatta Patent No. 1,046,066.

Evidence for the plaintiff taken under the Revised Statutes of the United States by agreement of counsel, before me,

GEORGE W. KNAPP, Jr.,
[SEAL] *Notary Public.*

Met pursuant to agreement of counsel at the offices of the National Enameling & Stamping Company, Light Street, Baltimore, Maryland, at 11 o'clock A. M., September 25, 1918.

Present: GEORGE C. ARVEDSON, Esq., of Counsel for Plaintiff;
MELVILLE CHURCH, Esq., of Counsel for Defendant.

Thereupon GEORGE W. KNAPP, a witness of lawful age, produced on behalf of the complainant, having been first duly sworn to testify the truth, the whole truth and nothing but the truth, deposes and says as follows: —

Direct examination.

By Mr. ARVEDSON.

Q. 1. Please state your name, age, residence and occupation.

A. My name is George W. Knapp; my age is seventy; my residence is Baltimore County, Catonsville, Maryland. I am an officer of the National Enameling & Stamping Company; director general is the title of my office. The duties of the director general are taking care of the physical end of the whole National Company, the different factories. I am also a member of the executive board and a director in the National Company.

Q. 2. Did you ever meet any representatives of the Eisenhutte Silesia Aktien-Gesellshchaft?

A. I have met the president, Mr. Winkler. I also met Mr. Schweisfurt, who was the general manager of the works. I do not know whether he was director general or not; I am not sure that that was his title. He was the head of the physical end of the

enameling works. They were the two men I saw that had this electric device.

Q. 3. What was Mr. Winkler's position?

A. I understood he was president of the Silesia Company.

Q. 4. What business did these two gentlemen have with you or your company when you first met them?

A. They came on here to sell the electric spot welding outfit.

Q. 5. Can you fix the time in any way of your first interview with them?

A. It was in 1904; I cannot say in what month.

Q. 6. What happened as a result of this first interview with them?

A. They brought their invention before the executive board of the National Company and Mr. Haberman was then our vice-president, and Mr. Haberman and I were deputized to go to Europe to investigate this electric welding device or invention, whichever you call it.

Q. 7. Did you go to Europe?

A. Yes, we went to Europe. Mr. Winkler met us in Berlin. We talked about the purchase of this electric process, and we found out that they would not show us what they had until we deposited $10,000 in the Bank of Berlin, in the Deutsch Bank of Berlin. We telegraphed back to America for $10,000 and the $10,000 was deposited with a banking concern in New York, Heidelbach, Ickelheimer & Company. We deposited the $10,000 in the bank in America, that is, our people did, to our order, and transmitted to the Berlin bank before these Silesia people would show us the machine. Well, we deposited the money and then we went out to the Silesia works, out to their factories, and examined the invention. We were pleased with the invention and we came back and signed an agreement to purchase it for $10,000. I have here the old cancelled check for the $10,000.

Mr. ARVEDSON. The plaintiff offers in evidence the original cancelled check produced by the witness, being the check of the National Enameling & Stamping Company, dated December 2, 1904, showing the payment of $10,003 for this purpose.

Q. 8. Will you please read the check which you have just produced into the record?

session of the National Enameling & Stamping Company, to be produced at the trial if called for.)

Q. 13. Then, if I understand you correctly, you were in Germany in 1912, after your trip in 1904?

A. Yes, I believe that was the time. I was not there in connection with the electric welding machine, though I did see Mr. Winkler when I was there.

Q. 14. Did you obtain any machinery in Germany at the time of this visit in 1904?

A. Yes.

Q. 15. What machinery was that?

A. In the contract that was made with the Silesia people, that is, with this ten thousand dollars, they were to give me two electric welding machines. Then I purchased from the Allgemeine Electricitats Gesellshchaft a dynamo and switchboard and such accessories as would go with these two welding machines that the Silesia people gave me as part of the contract for the ten thousand dollars.

Q. 16. Did you ever receive these machines?

A. Yes, and I have them in the factory now.

Q. 17. Did you ever receive bills for those machines?

A. Yes.

Q. 18. Have you the original bills?

A. No; the original bills went to the central office. We have a book at the factory wherein we enter all the bills and then send the original to the central office for payment. But we have a book where we enter all machinery of every description.

Q. 19. Since you are unable to produce the original bills, can you produce the book containing the copies of those bills?

A. Yes, I can.

(Witness presents book to counsel.)

Q. 20. Will you read into the record the entries in the book which you have just produced?

A.

"Feb. 15. We are sending you through
Messrs. Lorenz & Schmidt of Hamburg
carriage forward to Baltimore E. S. No. 3

One case gross weight 402 k countg 1 Electric Machine in separate parts . .	525.00	
Consul's fee	10.60 Mk	535.60
"15. We are sending you through Messrs. Lorenz & Schmidt of Hamburg carriage forward to Baltimore C L N. 1-ounce case gross weight 326 o. Kg. cont'g Electric machine ready mounted . . .	525.00	
E. L. N. 2-1-case gross o. weight 353 o kg. cont'g 1-electric machine ready mounted,	525.00	
E L N. 3-1 case gross weight 402 o kg. 1-electric machine in separate parts . .	525.00	
Consul chgs	10.60	
The cost of cases of packing amounting to S. L. k70 are included in the above prices Deduct frt. by Am. Hamburg .	25.30	1560.30

May 31. Eisenhutte Silesia
1 case Gross 1233 Net 960 kg. A E G 2934
1 case " 177 " 155 " A E G 82935
One two phased alternating current machine E. S. D. L. 750/40 40 K. V. A 250 volt normal 280 volt maximum
750 turns, 50 periods with pulley 560,280
1 set of fundament rails
1 case gross 40 net 185 Kg. A. F. G8560
1 Magnetic regulator
1 case 1 crate Gro. 389 Kg.
1 self supporting marble switchboard.
1 900,700 25 Mm with wood frame and wall anthars
2 Perforated steel sheets
2 Dynamometrical precession voltmeters 12449
2 Dynamometrical precession ampremeters 12457
2 Double poled switches with covers 17205

2 Double poled safety fuses 10631 with cover and welding insertions 11105.	
Total amount marks	3290.00
Consul's fee for legalizing invoices . .	10.60
Marks	3300.60
3300.60 marks is equal to American money,	$785.54"

Q. 21. What is the year referred to in this book?

A. 1904,— no; I don't know that. I have to guess at that. These bills might have come with the machine or before or after the machine. You will have to be governed by the dates on the entry of the bill. That would be better than guessing at it. How could I remember fourteen years ago?

Q. 22. What is the year referred to in this book?

A. 1904 or 1905; I don't know which. I would have to post myself on that. This is the bill book for 1905, I see by referring to the back of the book where it bears the legend in gold letters stamped on the cover, "Bill Book. 1905. N. E. & S. Co."

Q. 23. How soon after you returned from Germany did the machinery which you bought there arrive in this country?

A. To the best of my knowledge, it was about six weeks.

Q. 24. After this machinery arrived, what did you do with it?

A. We put it up in the factory and started to work it.

Q. 25. What sort of work did you use it for?

A. Electric welding of handles and spouts and lips on coffee boilers and ears on kettles and everything for which it was applicable.

Q. 26. Have you one of these machines now?

A. I have both of them, but one of them has been somewhat altered. It was a foot machine and we altered it to run by power. But we have one that is in its original state as it came to us.

Q. 27. After you returned from Germany, did you make any report of your work in Germany to your company?

A. I wrote a letter to the president, thinking he might be interested in what we had done and how we had spent the company's money. I wrote him a letter of which I found a copy the other day [*handing copy to counsel*].

Q. 28. What is the date of this report?

A. January 3, 1905.

(Copy of report handed to counsel for defendant for inspection.)

Q. 29. Did you ever get any drawings of these machines?

A. Yes; the company furnished me with the working drawings of the two machines that they gave me with the contract.

Q. 30. Can you produce those drawings?

A. Yes [*producing drawings and handing to counsel for plaintiff*].

Mr. ARVEDSON. Counsel for complainant now offers in evidence the drawings produced by the witness, and they are marked "Plaintiff's Exhibit No. 8, Drawings of Machine Bought by National Co. from Silesia Co., A. B. C."

(NOTE. It is stipulated by and between counsel for the respective parties that photostatic copies may be used in evidence in place of the original drawings, with the same force and effect as the originals, subject to the production of the originals for comparison and correction, if desired.)

Q. 31. Where have these drawings been since you first received them?

A. They have been in this office,—in the office of the National factory at Baltimore ever since we received them.

Q. 32. Were both the machines which you bought of the same type?

A. No; one has a vertical movement and the other has a circular movement, a movement in a sector. Otherwise the machines are alike.

Q. 33. What have you done with these machines since you first received them in this country and since you put them into use?

A. We have been using them ever since we received them and they are still in use.

Q. 34. Have you ever made any other machines of this sort?

A. Yes; we have made a considerable number of these machines off of the drawings and by using the first two machines that came as patterns.

Q. 35. Do you know how many machines in all you have made?

A. I imagine we have made upwards of one hundred.

Q. 36. Were all of these machines used in this factory, or in some of your other factories?

A. Some of them were shipped to the other factories of the National Company, to New York and St. Louis and Milwaukee and New Orleans.

Q. 37. For what sort of work were these machines used by you?

A. Putting on spouts, handles and lips, and all such stuff as has been heretofore riveted on.

Q. 38. Were there any savings or other advantages?

A. Yes, there was considerable saving in the welding over the riveting.

Q. 39. What were some of these savings?

A. As much as sixty-six per cent, probably more in some cases. They changed the class of labor used. You could work the welding machine with inferior labor, where it would take a skilled operator to rivet. There is where we saved something, beside the cost of the rivets.

Q. 40. You have spoken of using unskilled labor for this work; how unskilled do you mean?

A. Well, what we call ordinary labor we could teach inside of a half an hour how to work an electric welding machine, where it would take three or four days before a man could learn how to rivet,— sometimes longer than that.

Q. 41. What are the ages of some of the employees who do this work?

A. We cannot work them under sixteen.

Q. 42. Do you have any employees who are on this work now; and, if so, what are their ages?

A. The boys who are running them now, especially the one that was running them yesterday, was under sixteen, but we have a permit from the Bureau of Labor and Statistics for him to work, and they only work eight hours. You can run it with that class of labor.

Q. 43. Will you please compare the advantages and disadvantages of riveting with welding with these machines?

A. The advantages of welding are these: You get your work very much faster from the operator; you save the rivets that you

had used theretofore, and you save in the different class of labor, as I mentioned before; you can use cheaper labor.

Q. 44. Will you compare riveting with welding with reference to enameling, if you please?

A. This electric welding applies more to sheet iron than anything else. In enameling when we rivet ware such as enamel ware, when we rivet on handles and spouts and the like, the enamel would jump off the heads of the rivets on the inside of the article after it was enameled, where the electric welding obviated all that. This applies to enameled ware, of course.

Q. 45. Are there any other advantages of enameled welded ware over enameled riveted ware?

A. Only the appearance; it looks nicer. That is the only advantage I know of.

Q. 46. In what way does it look nicer?

A. You do not have the projecting rivet or the head of the rivet showing; it makes a smooth finish.

Q. 47. Where is Mr. Haberman, whom you have referred to?

A. He is now living at the Waldorf Hotel in New York when I last heard of him.

Q. 48. Do you know how old he is and what his health is?

A. I think the old man is about eighty. He is in pretty bad health. He is a very feeble man; he is not now in business.

Q. 49. Who installed these machines in this factory?

A. I did.

Q. 50. I mean what workman installed them?

A. We have an electrician, a foreman.

Q. 51. What is his name?

A. William A. Herring.

Q. 52. Is Mr. Herring acquainted with the manufacture of other machines which this company has built?

A. He knows about all machines that we have used in this factory, also the two machines in question. He was here when the machines were installed in this factory.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 53. Mr. Knapp, your company to some extent still employs rivets instead of electric welding?

A. Yes.

×-*Q.* 54. How many riveters do you employ?

A. I do not believe we have any now, today. I do not think there are any riveters in the house today, as there is not sufficient riveting done to keep a corps of riveters such as we did keep at one time, owing to the change of affairs in our factory. We do not use as many riveters as we did use heretofore.

×-*Q.* 55. Leaving out of consideration other advantages or disadvantages, is not a rivet a stronger mode of connection than an electric welding connection?

A. No; you have to qualify that to some extent. If it were a small rivet and a small weld, one would be as strong as the other, but I do not know how far you could take that and measure the strength if the rivets were brought up to two inches in diameter. You have got to draw your electric welding in proportion. That is a little technical to answer that question. The ordinary welding in a tin factory is just as strong as the ordinary riveting that has been done heretofore. Of course we use little bits of rivets. But if you get to a big rivet like that [*indicating approximately two inches*], you could weld it down like these fellows do who weld rivets in building ships. I don't know that you could ever get it any stronger.

Redirect Examination.

By Mr. ARVEDSON.

RDQ. 56. What sort of work do you use riveting on?

A. We use rivets for tin work, not black work at all. Electric welding is not fit for tin, but it is fit for all kinds of iron work, sheet iron and sheet steel. We make enameling out of sheet iron and sheet steel, and the same way with Japan work.

RDQ. 57. Will you explain this a little further, if you can?

A. To weld tin ware it makes a black spot and burns the tin and in sheet iron or sheet steel it does not make that spot. The

extreme heat at which the welding is done does not interfere at all, where it would burn tin.

RDQ. 58. Are there any other differences between the ware that is welded and the ware that is riveted?

A. Only in appearance; that is the only difference I know of in the finished ware.

RDQ. 59. How many factories has this company which use the welding process which you have testified about?

A. We have two factories in Baltimore, Maryland, two in St. Louis, one in Milwaukee, one in New Orleans and one in New York.

RDQ. 60. What is the usual size of the rivets that you use?

A. We use from 16-ounce to 2-pound, with all intermediate sizes. When I say 16-ounce rivets I mean 16 ounces to the thousand rivets. That is the way we designate the sizes.

RDQ. 61. Are you willing that Mr. Church see that original machine which you have here in the factory?

A. Yes.

(Counsel and witness adjourned to the factory to examine the machines.)

RDQ. 62. Have you shown the original machine that you obtained in Germany to Mr. Church?

A. I did show him the original machine that came from Germany.

Recross Examination.

By Mr. CHURCH.

R×Q. 63. I noticed that the electrodes in the machine were not tapered, but were blunt at the ends, as are the electrodes shown in the drawings which you produced here this morning; are those electrodes now in the machine like those that you ordinarily use in connection with the machine?

A. No; we changed the electrodes. If I want to make a nice neat job I taper the electrode. You have to do it to get nice, neat work. The points wear off and they do not put them on any more.

R×Q. 64. But the fact is that the electrodes now in the machine are blunt and not tapered. Is that not true?

A. Yes.

R×Q. 65. And the fact also is that the electrode shown in the drawings which you have produced are blunt and not tapered?

A. Yes.

(Testimony of witness concluded.)

GEORGE W. KNAPP.

Thereupon WILLIAM A. HERRING, a witness of lawful age, produced on behalf of the plaintiff, being first duly sworn to testify the truth, the whole truth and nothing but the truth, deposes and says as follows: —

Direct Examination.

By Mr. ARVEDSON.

Q. 1. Please state your name, age, residence and occupation.

A. My name is William A. Herring; my age is fifty; my occupation is electrical engineer; I live at 221 North Lakewood Avenue, Baltimore, Maryland.

Q. 2. How long have you been working for the National Enameling & Stamping Company?

A. Approximately twenty-six years.

Q. 3. Did you see the machinery purchased by Mr. Knapp when he was on his trip to Germany?

A. I saw the machines when they arrived, when they were brought to the plant here in their original cases.

Q. 4. Did you have any way of knowing that this machinery which you saw came from Germany?

A. Only by certain marks on the box; certain marks on the boxes which were hermetically sealed. I do not know definitely that they came from Germany only from those marks.

Q. 5. Can you tell me in a general way the approximate time of the arrival of this machinery, whether it was two years ago or four years ago, or how many years ago it was?

A. I judge it was about five years ago. I may be mistaken on that; that is only approximate.

Q. 6. Have you any way of fixing that time?

A. Only by invoices which Mr. Knapp has, or the bill of lading.

Q. 7. What connection did you have with these machines after they came?

A. I erected them and operated them.

Q. 8. You have spoken of some machines that came from Germany; is any one of those machines in this plant now?

A. The machines that I refer to are the ones that are in the plant now.

Q. 9. Is any one of these machines in substantially its original condition still?

A. I would say that there has been some little drilling and so forth on them, but outside of that they are in their original condition.

Q. 10. Where is that machine located?

A. It is in the portion known as the welding room.

Q. 11. Which machine in the welding room is this particular machine that you have reference to?

A. The one I have reference to that shows the greatest originality is the one in the welding room. There is another in the enameling room, building No. 6, and on that machine the castings and so forth are part of the original German machine.

Q. 12. There are several machines in the welding room; which one of the machines in the welding room is the original machine that you have spoken of?

A. The one that I refer to as the original machine in the welding room is the one which appears to have the lowest stand. I would refer to that particular machine also as a rotary machine that is now in the welding room, that being the only one there.

Q. 13. What do you mean by "rotary"?

A. It moves in an arc, in a rotary manner instead of a vertical line.

Q. 14. Will you explain a little further what you mean by a rotary machine?

A. The motion of this particular machine in accomplishing its work is a rotary motion; it moves in a circle and not in a vertical line.

Q. 15. What part moves in a circle?

A. The part known as the head, carrying the top electrode.

Q. 16. Was the other machine which is no longer in its original condition a plunger type or a rotary type of machine?

A. Plunger type.

Q. 17. Do you know if this company, the National Enameling & Stamping Company, has built any other machines similar to either of these two types you have referred to?

A. Yes, they have.

Q. 18. Can you give an estimate of the number of these machines which have been built?

A. I would judge from eighty to one hundred. The sum total of the machines built would consist of the two types.

Q. 19. Were these machines built for use by this company alone or for others?

A. As far as I know, I could not answer that question.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 20. In my examination of the machine in the welding room today I noticed that the electrodes were blunt and not tapered; were the electrodes in the machine as it came originally like that?

A. Yes, blunt.

Redirect Examination.

By Mr. ARVEDSON.

RDQ. 21. Are the electrodes perfectly flat?

A. They have a tendency, especially the lower one, to wear slightly round, due to moving the work about, especially when work is put on there of a circular nature; they are, as a general thing, flat.

RDQ. 22. What do you mean by "as a general thing"?

A. If I were to install a new electrode and make a point for it, I would just simply leave it flat.

RDQ. 23. How long does it stay flat?

A. Not very long; probably in the course of a day it would wear in the shape of the work.

RDQ. 24. How long do the electrodes last?

A. The lower electrode will last, by fairly constant use ten hours a day, it will last three months. The upper electrode will last a year.

RDQ. 25. How long does the upper electrode remain flat?

A. Constantly.

(Testimony of witness concluded.)

WILLIAM A. HERRING.

District Court of the United States, Eastern District of Michigan, Southern Division. In Equity.

THOMSON SPOT WELDER COMPANY, Plaintiff,

v.

FORD MOTOR COMPANY, Defendant.

On Harmatta Patent No. 1,046,066.

Evidence for the plaintiff taken under the Revised Statutes of the United States and the Equity Rules of the Supreme Court by agreement of counsel. Before me,

HECTOR M. HOLMES,
Notary Public.

[SEAL]

Met pursuant to agreement of counsel at the office of Fish, Richardson & Neave, 84 State Street, Boston, Mass., at 10.30 A. M., November 5, 1918.

Present: J. L. STACKPOLE, Esq., of Counsel for Plaintiff;
MELVILLE CHURCH, Esq., of Counsel for Defendant.

GEORGE A. CUTTER, having been duly sworn, deposes and says as follows: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation.

A. George A. Cutter; 44 years; 201 Millage Avenue, Dedham, Massachusetts; vice-president and general manager Thomson Electric Welding Company and Thomson Spot Welder Company. For a year or more I have acted as the chief executive of both of the Thomson companies in the absence of the president, Major J. W. Farley, who is now in France. The treasurer, Mr. Elliott Farley, is also in the United States service and is at present stationed at Florida. I am also a director of both of the Thomson companies and a member of the executive committee of each company.

Q. 2. How long have you been connected with the Thomson companies and in what capacity?

A. With the Thomson Electric Welding Company since the spring of 1916, first as acting general manager, then as general manager, vice-president, etc. With the Thomson Spot Welder Company since its formation, first as treasurer and general mana-

ger and director and then as vice-president, general manager, director, etc.

Q. 3. Does the Thomson Spot Welder Company manufacture and lease spot welding machines?

A. It does.

Q. 4. Can you produce a catalogue illustrating some of the spot welding machines manufactured and leased by the Spot Welder Company?

A. Here is a series of bulletins describing and illustrating the principal machines in the line. The company makes and leases other sizes of spot welders in addition to those shown.

(Counsel for plaintiff offers in evidence the series of bulletins produced by the witness, and the same are marked "Plaintiff's Exhibit No. 9, Thomson Spot Welder Bulletins".)

Q. 5. What are these bulletins numbered?

A. Bulletin No. 201, Bulletin No. 203, Bulletin No. 204, Bulletin No. 205.

Q. 6. Can you produce a couple of electrodes such as are illustrated in some of the spot welding machines of Plaintiff's Exhibit No. 9?

A. Here are two ordinary electrodes such as are customarily used in some of the machines illustrated in the bulletin. The electrodes, however, vary considerably in shape according to the nature of the work to be done, and in dimensions. For instance, in many kinds of work the upper electrode is longer than the lower electrode. In certain instances the bevelled portion makes a more acute angle with the axis of the electrode.

Q. 7. About how many spot welder machines have the Thomson Company got out under lease or license?

A. Approximately, 1,000. This covers in a general way two classes of machines; one class which was built by the Thomson Company and the other class machines which were built by other companies and to operate which the Thomson Spot Welder Company has granted licenses.

Q. 8. About how many spot welders a year would be made by these machines in the course of their normal employment at fair capacity?

A. If these machines were all run at a fair average capacity for

nine hours a day, 308 days per year, they would produce upwards of two and one-half billion spot welds per year. Inasmuch as the machines licensed vary greatly in size and speed of operation, in order to make an estimate of a fair average capacity per machine I have taken as a standard current practice in the manufacture of various automobile parts and have taken average of fifteen or twenty or more different operations, and have used as a base figure thus obtained 973 welds per hour per machine.

Q. 9. Will you produce a list of spot welding machines under lease or license from the Spot Welder Company, giving the names of the licensees, the number of machines for each one and the general purpose for which the machines are licensed?

A. Here is a such a list marked "Partial list of licensees" giving number of machines and uses covered by license under Harmatta patent, dated October 30, 1918. This list was prepared under my direction by employees of the Thomson Spot Welder Company and was obtained by going over the licensors' copies of signed license contracts. In the column headed "Use" we have given what we understand to be the product for which the machines are or may be used. In many cases we have copied the uses directly from the license contract. In other cases the license gives the right to use or perform the Harmatta process for any purpose with certain exceptions, which are shown on the rider on page 18.

(Counsel for plaintiff offers in evidence the two electrodes produced by the witness, and the same are marked "Plaintiff's Exhibit No. 10A", and "No. 10B, Sample Electrodes of Plaintiff's Spot Welding Machine".)

(Counsel for plaintiff also offers in evidence the list of spot welder machines produced by witness, and the same is marked "Plaintiff's Exhibit No. 11, List of Licensed Spot Welder Machines".)

Cross Examination.

By Mr. CHURCH.

×-*Q.* 10. Approximately, how many butt welding machines or electric welding machines other than those especially adapted for spot welding has Thomson Electric Welding Company or Thomson Spot Welder Company leased or sold during the period in which

the thousand spot welding machines that you have referred to have been leased or licensed?

A. The greater part of the machines covered on the list have been licensed since the formation of the Thomson Spot Welder Company about November, 1916, or in approximately a two-year period. The Thomson Electric Welding Company has probably sold or leased between two and three hundred electric welders during the last two years. This figure may be somewhat larger or smaller, as without consulting the records of the company I cannot give a more definite answer.

×-*Q.* 11. How many spot welding machines has the Thomson Spot Welder Company actually made and licensed during the two years of its existence?

A. Without consulting our records I place this at approximately five hundred.

×-*Q.* 12. Approximately, then, about 50 per cent of the thousand machines referred to by you as having been leased or licensed by Thomson Spot Welder Company were spot welders that had been previously made by Thomson Electric Welding Company or other manufacturers. Am I right about this?

A. I believe that this is approximately correct.

×-*Q.* 13. Can you and will you produce bulletins or catalogues of the Thomson Electric Welding Company covering the same period as the bulletins or catalogues of the Thomson Spot Welder Company embodied in Plaintiff's Exhibit No. 9?

A. Yes, I can and will.

(Counsel for defendant requests that the witness when convenient hand to the counsel for complainant the bulletins referred to, and that the examiner mark the same "Defendant's Exhibit XX".)

×-*Q.* 14. During the last ten years has there not been a great development of electric welding, both butt welding, so called, and spot welding, so called?

A. There has been a considerable development in a commercial way.

×-*Q.* 15. How long has Thomson Electric Welding Company been engaged in the manufacture and sale or leasing of electric welding machines adapted for spot welding, so called?

A. When I first became connected with the Thomson Electric Welding Company the business of manufacturing and selling or

leasing electric welding machines adapted for spot welding was practically at a standstill. I was informed that the company had previously manufactured and leased or otherwise disposed of either directly or through another company having certain sales rights a hundred or more spot welders. Without consulting the records of the company I cannot state when the company first started to put out such machines.

×-*Q.* 16. How long have you been connected with Thomson Electric Welding Company in any capacity?

A. Since the spring of 1916.

(Deposition closed. Signature and certificate waived.)

Adjourned to the same place on Monday, November 11, at 2 P. M., when the plaintiff gives notice that the deposition of James H. Gravell will be taken on behalf of the plaintiff.

Met pursuant to agreement of counsel at the office of Fish, Richardson & Neave, 84 State Street, Boston, Mass., at 2 o'clock, November 11, 1918.

Present: J. L. STACKPOLE, Esq., of Counsel for Plaintiff.
MELVILLE CHURCH, Esq., of Counsel for Defendant.

Second Deposition of James H. Gravell.

Direct Examination

By Mr. STACKPOLE.

Q. 1. Are you the James H. Gravell who has already testified in this case?

A. Yes.

Q. 2. Have you read the deposition of Frank L. Dyer given on behalf of the defendant herein, and read the patents to which Mr. Dyer refers?

A. Yes.

Q. 3. Please compare the disclosures of the Harmatta patent in suit and of the Harmatta first original application for that patent, and state whether or not you find that they describe the same process.

A. The Harmatta patent No. 1,046,066 describes exactly the same process as is described in Harmatta's original application.

Harmatta's patent describes (page 1, line 10) "a novel means of fastening the component parts" together by a process of electric

welding. This process "affords a cheap and practical substitute for riveting". The process is not a makeshift or a different means which can be used for obviating the use of rivets, but from a practical standpoint is to all intents and purposes a rivet or what might be termed an electric rivet. It has, however, a decided advantage over rivets because "there are no rivet heads to mar the finish of the back or outer surfaces of the plate". According to Harmatta, his electric weld or what we have termed his electric rivet was "particularly useful in fastening plates or strips of metal to one another inasmuch as it may be employed for the thinner sheet metal, such, for instance, as is used for sheet metal ware like vessels or household utensils".

Harmatta's original application had exactly the same object in view and described the same kinds of welds which we have termed electric rivets. Quoting from the original application we find that the weld Harmatta describes "perfectly answers the purpose of a rivet" and is especially useful "in the case of thin vessels". These welds, the same as rivets, occur "intermittently or at certain spots only".

In both Harmatta's patent and the original Harmatta application the fundamental ideas were the achievement of a small, well-defined electric weld which not only would act a rivet but would be an improvement over rivetting.

To carry out this idea of welds which would perfectly answer the purpose of rivets Harmatta describes in his patent No. 1,046,066 a method or process. Like the method of rivetting Harmatta first overlaps the two sheets of metal, as he shows in his Figure No. 1 (page 1, line 26), "in their juxtaposed" position. This overlapping of the work is described by Harmatta throughout his patent (page 1, lines 26, 27; page 2, lines 9, 10).

Harmatta's original application also describes this overlapping of the parts to be attached by his electric rivet and illustrates it in his Figure No. 1. In the original application in describing Figure No. 1 he tells us that "the two sheet metal or other bodies, the edges of which lie upon each other, are introduced between the two electrodes *a* and *b*".

As far as the overlapping of the work goes, both the patent and the original application absolutely agree as to the direction of over-

lapping the work and both patent and application show the same illustration.

After overlapping the sheets Harmatta in his patent tells us that he concentrates his welding current and his welding pressure at any spot over this overlapped portion. Reading through the patent we find such passages as (page 1, lines 26, 27): "their juxtaposed or opposing plane surfaces by application of pressure and heating current localized in such spots". (Page 1, line 76:) "The desired pressure and heating current at any desired distinct small spot or area." In fact, all through the patent references are made to his ability and to this step in his process to concentrate the heat and pressure at any spot over the overlapping portions of the work.

The same step in the process is equally evident in Harmatta's original application. We find that the same tools are used for applying both the electric current and the pressure to the work. Harmatta tells us "the new process consists in one of the electrodes (or both of them) not only serving to feed the current, but also being employed for exercising a more or less strong pressure". These electrodes are arranged "directly above the surface or point to be welded". The point to be welded is of course any point over the overlapped portion of the work.

According to Harmatta's patent, the next step in the process consists of heating the work in the line of the current and pressure. After positioning his tools so as to apply the current and pressure to the desired spot, "the place of welding is brought to the proper temperature". He tells us that effective welding such as is accomplished by his process ordinarily results when the work is "well hammered or pressed". In other words, the welding tools "may each be adapted to work on the smallest possible surface contact so as to localize the pressure and the path of the heating current to a very small spot only". This production of a heated path directly through the overlapping sheets from one tool to the other (Figure No. 1) is further described by Harmatta (page 2, line 50): "thus producing a flow of heating current through the work itself substantially localized therein so as to bring the same to the necessary welding temperature at the desired spot only".

Harmatta describes this step in his process in his original application, that is, the heating of the work in line with its pressure and

current. "The member which feeds the electricity is thus at the same time the tool, and in this manner the most favorable conditions of working possible are secured, since as is well known in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough". He tells us that never before his process has the pressure been exercised "by means of the electrodes located in the direction of the current directly above the surface or point to be welded".

Both the patent and the original application agree in that step in the process where the work is heated in line of the current and the pressure.

The last step in the process according to Harmatta's patent consists in welding the parts together without modification or without mutilating or damaging the material. He tells us in the patent that his process results in (page 2, line 56) "the welding of the plates together in the small sharply defined place of welding at the point or spot desired which perfectly answers the purpose of a rivet". He also tells us (page 2, line 85) that there is an "absence of burning, roughening or disintegrating of the backs of the plates". It stands to reason that no modification or mutilation of the plates would be tolerated in a process which was to be an improvement over the old-fashioned rivet and no proof of the absence of modification is better than the fact that the process has in many cases entirely superseded riveting.

In his original application Harmatta could not tell us better that he does not mutilate his work than by advising us that his welding "perfectly answers the purpose of a rivet", for any process which mutilated or scarred the work could not be considered by the trade which was used to the smooth finish of riveted joints.

The steps in Harmatta's patent consisting of (1) overlapping the sheets; (2) concentrating the current and pressure at any spot over the overlapping portions; (3) heating the work in the line of current and pressure; and (4) welding the parts together without modification, are plainly evident in Harmatta's original application. And Figure No. 1 of Harmatta's patent, which shows the arrangement of the parts for carrying out this process, is identical with Figure No. 1 of the original application, which shows the arrange-

ment of parts for carrying out the process as described in the original application.

Harmatta in his patent tells us that his process is an electric welding one, that is, his process is electric welding. If we inquire into the meaning of this term "electric welding" we find that the term was invented by Professor Thomson to describe his invention which he covered by patent No. 347,140. This invention was the fundamental patent on electric welding, and in it Thomson says (page 1, line 30): "The new art, which I term 'electric welding'". This new art consists in passing large volumes of current through the work for the purpose of heating it at the joint to be united, when on the application of pressure one part is forced into the other causing a weld. One of the characteristics of this electric welding process, which was carried out strictly according to Thomson's ideas, is the formation of a burr or upset due to the application of pressure to the parts being welded. Another characteristic of electric welding, according to Thomson, is that the work being heated constitutes (page 3, line 11) a large fraction of the total resistance of the welding circuit. According to Thomson, nothing is transmitted to the work except electricity and pressure,—that is, the heat is wholly developed within the work. Harmatta in his patent goes to considerable pains to tell us that his invention lies in the electric welding field and is a special form of electric welding.

Electric welding was a well-known art from a commercial standpoint at the time of Harmatta's application. It was well known at that time that cold electrodes applied the electricity to the work, and that these electrodes pressed the work together. There was therefore no need for Harmatta in his original application of his patent or in the finished specification of his issued patent to describe fully and in detail all the characteristics of electric welding. It was sufficient only to say that his invention was "electric welding" for those skilled in the art to understand the general characteristics of his process. As soon as he said that his invention related to a novel means of fastening the component parts of the work together by a process of electric welding, all those skilled in the art immediately realized that nothing was transmitted to the work except electricity and pressure, and that all heat used in the process was developed within the work itself by the passage of the current

through the work. For fear, however, that he might be misunderstood, Harmatta explains in his patent what he means and what is meant by the term "electric welding" by saying: "I mean that well known process in which the work is brought to a welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts joined by the welding pressure."

Harmatta's original application is very clear in assigning the invention to the category of "electric welding". In his first paragraph he tells us that he has invented something new and useful in electric welding. In his third paragraph he tells us about electric welding and some of the things which he thought were novel with him, so that there is no doubt in the inventor's mind that he is dealing with the true electric welding process in which the heat is developed within the body of the work. It is well to note in the original application that the inventor applies nothing to his work except electricity and pressure.

Both Harmatta's patent and his original application describe a true electric welding process where nothing is applied to the work except electricity and pressure and all heat employed in the process is developed within the work by the passage of electricity through the work.

Although Harmatta's patent describes the true electric welding process, it differs in some respects from the conception of the art. One of these differences lies in the fact that Harmatta concentrates his current by means of the electrode. Figure No. 1 of Harmatta's patent shows the shape of the electrode used by Harmatta. This pointed electrode shown by Harmatta constitutes a special method of localizing the current by concentrating it directly to the spot to be welded (page 1, line 29). Harmatta describes this tool or electrode by telling us that the "tool pressed against the work" is "formed so as to engage the work by a spot or area of small extent" (page 1, lines 75–88). According to Harmatta, the "electrodes *a* and *b* of Figure No. 1 are by preference both formed to engage the work by a small area of contact and may each be adapted to work on the smallest possible surface contact so as to localize . . . the path of the heating current in a very small spot only". Harmatta's Figure No. 1 clearly shows this concentration of the current by

means of the electrode. Figure No. 2 shows the same thing, and this is likewise true of Harmatta's Figures No. 3 and No. 4.

In Harmatta's original application he tells us that the electrodes press on the place to be heated (third paragraph) and that these electrodes are pin-shaped, "the form of which may be suited to the particular purpose in view and which may be adapted to work on the smallest possible surface contact". These electrodes he shows in Figure No. 5 so that we can clearly see that these electrodes concentrate the current at the spot to be welded. The electrodes of Figure No. 5 are described as "having the form of pins". It should be noted that Figure No. 1 and Figure No. 5 of Harmatta's original application show these pointed or pin-shaped electrodes for concentrating the current and that these figures are identical with Figures Nos. 1 and 2 of Harmatta's issued patent, which also show pointed electrodes for concentrating the current.

Not only does Harmatta concentrate his current by means of pointed electrodes in his patent, but the same pointed electrodes act as pointed mechanical tools for concentrating the pressure used in welding. Harmatta in his patent tells us that the weld is "made by using a tool pressed against the work by its end and formed at such end so as to engage the work by a spot or area of small extent and serving likewise, by preference, as the electrode which feeds the current into the work to heat the same. The member which feeds the electricity being thus at the same time the tool . . . ". This tool and electrode combined which is shown at *a* in Harmatta's Figure No. 1 in order to concentrate the pressure as well as the current "are by preference formed to engage the work by a small area contact" (page 2, lines 24–27). By tapering or pointing his electrode Harmatta directs all the pressure used in his process to the small spot or area which he desires to weld.

In Harmatta's original application this same method of using the tool which concentrates the pressure as an electrode is carried out. In describing his process in his original application he tells us that the electrodes not only serve to feed the current, but are also employed for exercising the required pressure (second paragraph). These electrodes Harmatta shows in his Figures Nos. 1 and 5 (original application) as "pin-shaped" so that there is no doubt regarding the concentration of the pressure by means of these agencies.

Both Harmatta's patent and his original application describe pointed electrodes which are used for concentrating the pressure.

According to Harmatta's patent, when this concentrated current and pressure is applied to the work, as shown for instance in Figure No. 1, the current remains localized as it passes through the work (page 2, lines 50–52), so that the work only becomes heated directly beneath the electrode or between the electrodes as shown in Figure No. 1. It should be noted that the place heated for welding, that is, the portion directly between the electrodes *a* and *b* in Figure No. 1, is entirely surrounded or enclosed by relatively cold metal. The electrodes which supply nothing to the work except electricity and pressure are necessarily cold and the work itself, except directly between the electrodes, remains cold and it is therefore self-evident that the metal heated for welding is entirely surrounded or enclosed by this relatively cold metal.

In Harmatta's original application he tells us that the "electrodes are located in the direction of the current directly above the surface or point being welded" and he illustrates this condition in Figure No. 1 of his original application. On closing the circuit "a small round very sharply defined place of welding is caused" between the electrodes in the path of the current, and it requires no exercise of the imagination to realize that this metal heated for welding must be entirely enveloped by relatively cold metal; that is, on the top and bottom of the work the hot metal is bounded by the cold tool and through the body of the work the hot metal is bounded by the cold metal of the work itself.

Both Harmatta's patent and his original application clearly indicate that the metal heated for welding is entirely surrounded by relatively cold metal.

As the metal heated for welding is entirely surrounded by relatively cold metal in Harmatta's process, the heat is conducted away from this hot spot very rapidly because the hot metal is in unbroken contact with the cold metal and the weld must be made very quickly or it cannot be made at all; that is, the energy applied to the work for raising its temperature must be applied quickly, as otherwise the energy will leak away more quickly or as quickly as it is supplied. The condition is very similar to filling a leaky tank with water, for unless we fill it at once we cannot fill it at all, as the

water flows out as quickly as it is put in. The quickness of the process is especially noticeable in the thinner grades of metal, such for instance as is used for cooking utensils, where Harmatta tells us in his patent it requires but a moment, that is, at the right moment the pressure may be exactly regulated.

In Harmatta's original application he follows practically the same wording regarding this momentary action and, quoting from his last paragraph next to the claims, he says: "The pressure on the place of welding may at the right moment be exactly regulated or kept within the proper limits."

Both Harmatta's patent and his original application refer to this momentary action of his process, when carried out on metal suitable for cooking utensils.

(Adjourned to November 12, 1918, at 9.30 A. M.)

BOSTON, November 12, 1918, 9.30 A. M.

Met pursuant to adjournment.

Present, counsel as before.

Mr. Gravell continues his answer to Q. 3.

One of the beauties of Harmatta's patent, or the process of the Harmatta patent, is the welding of the work without modification or scarring or mutilation. It is the absence of these things which makes the process so popular commercially, for after the actual welding is completed the article can be considered as finished. In the original Thomson process, as we have already noted, one of the characteristics was the formation of a burr or upset which in most cases had to be removed after the welding was completed in order that the object welded would have a presentable appearance and would be suitable for the purpose for which it was produced. This absence of burr was characteristic of the process Harmatta describes in his patent. The process, according to Harmatta (page 1, line 15), "is particularly useful in fastening together plates or sheets of metal to one another inasmuch as it may be employed for the thinner sheet metal, such for instance as is used for sheet metal ware like vessels or household utensils". This type of vessel was very well known in the trade previous to Harmatta's patent and the parts of which, previous to Harmatta's patent (or rather previous to the time his invention became known), were attached by rivets.

The process of rivetting was inexpensive and produced a reasonably good finish and unless Harmatta's process produced a better finish it certainly would not have been adopted, even though it was a cheaper process than rivetting. This advantage of the process over rivetting Harmatta points out (page 2, line 83): "sheet metal work made by this process is readily distinguished from that made by prior processes by the comparative absence of burning, roughening or disintegrating of the material on the back of the plate". This lack of modification in Harmatta's process is due to a great extent to the arrangement of his electrodes, as shown in his Figure No. 1. By this arrangement the metal heated for welding, as we have already noticed, is entirely enclosed by relatively cold metal and therefore cannot extrude and form the burr.

Harmatta's original application shows exactly the same arrangement of the work and the electrodes in Figure No. 1 of his application, showing that in the application also the metal heated for welding is entirely enclosed and therefore cannot extrude and form a burr. And, knowing this, Harmatta tells us in his original application that his weld (last paragraph) "*perfectly* answers the purpose of a rivet".

Both Harmatta's patent and Harmatta's original application disclose the fact that no modification of the work is involved in the process.

It should be noted that in the old-fashioned riveting process the parts being attached do not move in relation to each other during the process; that is, one part does not move toward the other part. This of course is self-evident. In rivetting therefore it is possible to accurately fit the parts together before processing and after processing the parts will remain unchanged in their relative position. Harmatta's spot welding process, or his process which produces what we have called "electric rivets", possesses this characteristic of rivetting. In Harmatta's process the parts are assembled exactly in the position required in the finished article and after processing the parts remain in exactly the same relative position. This can easily be appreciated by examining Figure No. 1 of Harmatta's patent. The parts according to Harmatta are lapped and in contact and the tendency of the welding tools is to force the parts together, but as the parts are already in overlapping contact and as the tools

only operate at a small spot over the overlapping portions it is impossible that the tool move the parts together any further.

This same characteristic is disclosed in Harmatta's original application. He tells us (last paragraph) "A small round very sharply defined place of welding is caused which perfectly answers the purpose of a rivet." His weld could not possibly answer the purpose of a rivet if the parts of the work being attached moved in relation to each other during the welding operation. The Harmatta original application clearly discloses this fact in his Figure No. 1.

Both the Harmatta patent and the original application disclose the fact that the parts being welded remain stationary in relation to each other during the welding operation.

We have already noted that the term "electric welding" was coined by Professor Thomson to describe his process. In this process large massive copper clamps gripped the bars to be welded together. This process was in extended commercial use prior to Harmatta's invention and it was general knowledge to all those skilled in the art that these copper clamps must be kept cool, and where large welding currents were used a water circulation was provided through the clamps. These clamps or electrodes of Thomson were really vises, and it does not require any more than common sense to know that a red hot vise is of very little use owing to the fact that as the metal becomes heated it becomes softer and will not stand the strains required of a vise. Harmatta's electrodes differ, however, from Thomson's electrodes, in that they are not vises but yet they transmit the pressure to the work and are therefore subject to strains, and the same common sense applies to Harmatta's electrodes as to Thomson's electrodes, that is, if they are to transmit the pressure, which Harmatta says they do (page 1, lines 76–88), they must be cold. It is especially true in Harmatta's process that the electrodes must be kept cool because the electrodes are pointed and a heated point is very hard to maintain, and if the first weld heated the electrodes it would cause them to become blunt and would be entirely worthless for the purpose when trying to make a second weld; yet Harmatta tells us (page 2, line 65) "the operation may be repeated upon the work at another point if it is desired to join the pieces at a number of spots".

In Harmatta's original application he discloses the fact that his

electrodes are cold by telling us that his invention is electric welding and corroborates this by telling us that the electrodes (second paragraph) "not only serve to feed the current, but are also employed for exercising a more or less strong pressure". He also tells us that the welding may be done (first line, third page) "intermittently", implying that the same tool may be used repeatedly to form welds; this certainly could not be the case if the tool became heated to any extent in making the first weld.

In both Harmatta's patent and the original application the process involves the use of electrodes which remain practically cold during the welding operation.

Harmatta's weld corresponds in size to a rivet. It necessarily must do this as he tells us that his invention is devised for replacing rivets. Referring to Figure No. 1 of Harmatta's patent, it will be noted that the path of the current produced by the electrodes corresponds in size practically to the shaft of a rivet suitable for uniting the two members he shows, and if we experiment according to Harmatta's instructions (page 2, lines 69–76), we will find that the size of the weld is limited in extent by the contact area of the electrodes, but may be varied under this limit to some extent by a variation of the current employed.

If we confine our attention solely to Harmatta's original application and arrange our work and electrodes as shown in Figure No. 1 of the application where (middle of page 2) "the electrodes are located in the direction of the current directly above the surface or point to be welded", we will find that the size of the weld is limited by the contact area of the smallest electrode and may be varied under this limit by varying the amount of current.

No matter whether we confine our attention entirely to Harmatta's patent or entirely to his original application and make a weld according to either, we will find that the size of the weld is limited by the area of contact of the pointed electrodes and may be varied under this limit by varying the amount of current employed.

It should be noted that in the old art of rivetting the only prepation required for attaching the parts was the providing of holes and the providing of rivets. In the process described by Harmatta's patent absolutely no preparation at all is required. The sheets are simply lapped, as Harmatta shows in his Figure No. 1, and it is

left entirely to the will of the operator where the "electric rivet" is to be placed. This omission of the preparation of the material in the Harmatta process is of great commercial advantage. All that is required in the Harmatta process is to superimpose the sheet metal (page 2, line 40), and place the superposed portions between the electrodes.

The same general characteristic is noted in Harmatta's original application. All that is required is to arrange the parts to be welded so that they (bottom of page 3) "lie upon each other". After so arranging them in this fashion they "are introduced between two electrodes *a* and *b*". The original application shows this lack of preparation in Figure No. 1.

Both Harmatta's patent and the original application indicate by descriptions and drawings that no preparatory modification of the material is required.

In the old art of rivetting every one knows that one rivet may be placed at a time; that is, the operator's attention may be given to each individual rivet. In the case of rivetting machines, the machine may be made very small because the same operation may be repeated over and over again where there are a number of rivets to be set and the machine need not have the capacity to set all the rivets at one time. In Harmatta's patent the same general idea is involved. Each "electric rivet" may be made individually, although there may be hundreds of rivets in the same article being processed. Harmatta tells us (page 2, line 65) "the operation may be repeated upon the work at another point if it is desired to join the pieces together at a number of spots". Harmatta's machine, therefore, is very simple in its construction, as can readily be seen from Figure No. 2 of his patent.

This idea of making one weld at a time is clearly indicated in the original application. He tells us (bottom of page 2) that "Figure No. 1 (of his application) is a view illustrating the welding of two sheets of equal thickness intermittently at certain spots only" and the simplicity of his machine is illustrated by him in his original application in Figure No. 5. This Figure No. 5 of the original application is identical with Figure No. 2 of his patent.

In both the patent and the original application it is clearly indicated that one weld can be made at a time.

If we examine Figure No. 1 of Harmatta's patent bearing in mind, as we have already noted, that the metal heated for welding is entirely surrounded by relatively cold metal, we will find that the weld occurs within the body of the metal, out of range of the operator's view; that is, the operator cannot see the weld he is making.

This same observation is noted regarding Harmatta's original application and is disclosed in the same way by Figure No. 1 of the application.

Both the application and the patent, therefore, indicate that the operator cannot see the weld he is making.

We have already noted that no preparation of the material is required in either the patent or the original application and even though a thick piece is to be welded to a thin piece no alteration of the material is required; that is, the thermal characteristics of plates of different thickness need not be considered. This is due to a large extent to the fact that the weld is made very quickly in both the patent and the application, so that the unequal losses in sheets of different thicknesses, of the heat, need not be considered.

In summing up the above analysis of the Harmatta patent and its original application we find that the two entirely agree. In both:

The object of the process is to produce an "electric rivet" or a small sharply defined place of welding.

The steps in the process are as follows: —

1. Overlapping the sheets.

2. Concentrating the current and pressure at any spot in the overlapped portion.

3. Heating in the line of current and pressure.

4. Welding without modification or mutilation.

The characteristics of the process are as follows: —

1. The parts are heated by their own electrical resistance.

2. The current for welding is concentrated by the electrodes.

3. The pressure for welding is concentrated by the electrodes.

4. The metal softened for welding is surrounded by relatively cold metal.

5. The weld is made very quickly.

6. No modification or formation of extruded metal takes place, or is involved in the welding operation.

7. The parts being welded remain stationary in relation to each other during the welding operation.

8. Electrodes remain cold during the welding operation.

9. The size of the weld is limited by the contact area of the electrodes and may be varied under this limit by varying the amount of current.

10. One weld can be made at a time.

11. No preparatory modification of the work is required.

12. The weld is surrounded and cannot be seen, that is, the operator cannot see the weld he is making.

Q. 4. Please refer to the patents of the prior art to which reference has been made by Mr. Dyer and classify them as to their subject-matter.

A. The following table will indicate the classification of the patents referred to by Mr. Dyer: —

1. *Patents not electric welding.*

a. Arc welding,	Bernados,	363,320.
b. Hot resister,	Coffin,	437,571.
	Bernados (German),	50,909.
c. Soldering,	Thomson,	496,019.
d. Heating only,	Blanchard,	466,266.
	Lemp,	531,197.
	Burton,	647,694.
e. Rivetting,	Thomson,	396,015.

2. *Electric welding.*

a. Butt welding,	Thomson,	347,140.
	Thomson,	347,141.
	Robinson,	574,942.
	Kleinschmidt,	616,436.
b. Seam welding,	Thomson,	444,928.
	Lemp,	553,923.
c. Cross wire welding,	Perry,	670,808.
d. Glut welding,	Parkinson (British),	14,536—1894.

Q. 5. Does the Bernados patent No. 363,320 describe the subject-matter of the Harmatta patent in suit?

A. Bernados patent No. 363,320 does not in any way describe the subject-matter of Harmatta's patent.

Bernados patent No. 363,320 describes a process of arc welding, a process entirely different from electric welding. If we connect one wire from a powerful battery to a sheet of metal and connect the other wire from the battery to a stick of carbon or graphite and place the ends of the stick of carbon in contact with the sheet of metal, no effect is produced. The stick of graphite may heat slightly but the temperature under ordinary conditions would not be too great to hold the carbon stick or rod in the bare hand. The current flows from the battery through the work and the rod, but the only indication that the current is flowing is a slight warming of the carbon rod. If, now, we slightly separate the carbon rod from the work, the electricity continues to flow across this break in the original circuit, with the production of a brilliant light at this broken part of the circuit. This brilliant light is known as an electric arc, or an electric flame. This electric arc or electric flame has many properties in common with an ordinary flame, such as for instance that produced at the ordinary gas jet, or by the many types of gas burners for heating purposes. Like an ordinary flame, it can be blown out and like an ordinary flame it develops a high temperature so that objects coming in contact with this flame may be heated. Bernados has made a practical application of the electric flame or arc to the melting of metals. When we strike or form an arc as we have described, the carbon rod becomes much hotter owing to the high temperature of the flame produced by it. This temperature is so great at the arc that the rod cannot be held in the hand and we therefore must supply a carbon holder, as shown by Bernados in his Figure No. 1. The electrical connections that we have described are illustrated by Bernados in his Figure No. 2. X is the powerful battery the positive pole of which is connected to the electrode or carbon holder which transmits the current to the carbon electrode D. The current is led back from the work shown at $r\ r^1$ to the negative pole of the battery X. The carbon flame produced between the electrode D and the work by separating the electrode from the work is very brilliant, in fact so brilliant that it cannot be viewed by the naked eye; in fact the light is so brilliant that it sunburns the face. The face and eyes therefore must be protected, which we find Bernados does by providing a screen N (Figure No. 3) of highly colored glass (page 2, line 51).

Bernados sets his electrode holder in a stand, which he shows at A in Figure 2, for the convenience of the operator. In Figure No. 3 the stand is mounted on a second stand, shown at M. This second stand M is provided with a number of notches so that the electrode stand may be placed in a number of definite positions. The flame originates, according to Bernados, at the carbon rod, which is made the positive pole of the circuit and terminates at practically the nearest point of the work to the end of the carbon rod. It is only at this point on the work that the work is heated (page 1, lines 87–93). All other portions of the work are heated by the conduction of heat through and by the work. This conduction of heat naturally takes place in all directions from the point being heated, and the point directly in contact with the electric flame therefore is the hottest part of the work. It is therefore practically impossible to overlap two plates or sheets and weld the overlapped portions away from their edges together because the heat of the electric flame only heats the outer surface and as this heat is not only conducted through the work transversely to the place to be welded but is also conducted away laterally. The process, therefore, can only be used to advantage where the points to be attached are exposed to the direct action of the electric flame, such for instance as shown at Figure No. 13. In case this process is to be used for melting the metal together at certain places, as shown in Figure No. 10, it is necessary to first provide the overlapped portions of the work with through holes as Bernados shows in his Figure No. 8, or to provide the holes at least through one of the members as Bernados shows in his Figure No. 9, so that the parts to be attached are in direct contact with the electric flame. If a strict localization of the heating effect is not required, the arc may be played on the overlapped portion for a long period so that the conducted heat will finally melt the metal of both plates, and if the metal is supported so that it will not flow away, like it is doing at Figure No. 20, the parts may be melted together. This process of melting parts together at definite places is more theoretical than practical and has never become a commercial practice. This is because the metal to be operated on, that is, the part between the two overlapped sheets, cannot be brought in contact with the electric flame and is really out of the scope of the invention, which

(page 1, line 18) "contemplates the formation or production of the voltaic arc between the metal to be operated upon and a conductor, which is brought for said purpose into proper proximity to that point on the metal which is to be operated on".

The process and product and the object of the invention are totally different from Harmatta's process. The characteristics of Bernados' patent are different from the characteristics of Harmatta's patent. Bernados' object was not to make an "electric rivet". The patent has nothing whatever to do with welding at all, and as far as I know the whole specification does not contain the word "weld". The steps in the process are totally different from Harmatta. There is no concentrating of the welding current and the welding pressure to any spot in the overlapping portions of the metal. There is no heating in the line of current and pressure. There is no welding without modification. In fact, there is no welding at all, for the process simply deals with melting. As far as the characteristics of the process go, the work is not heated by its own resistance; the current is not concentrated by the electrodes; there is no pressure at all used in the process: the melted metal is not enveloped or enclosed by relatively cold metal; the parts are not attached quickly; there is no absence of modification of the material during the attaching operation for the metal of the work is totally altered in character by melting it; electrodes do not remain cold during the attaching operation; the size of the point of attachment is not governed by the contacting area of the electrodes for it must be remembered that the electrode does not contact at all; and the point of attachment is not hidden from the operator's view.

Bernados' patent shows a process totally different from Harmatta's process; in fact, so different that the two are not easily compared.

Q. 5. Does the Coffin patent No. 437,571 describe the subject-matter of the Harmatta patent in suit?

A. Coffin's patent does not in any way describe Harmatta's process.

This is so obviously different that an analysis seems superfluous. Carbon resistors are made to contact with the parts of the work to be heated (page 1, line 31). It is immaterial to the success of

Coffin's process whether the current flows into the work or not. (See the left-hand rod or part of the work in Coffin's Figures Nos. 4 and 5.)

There is no concentrating of welding current and welding pressure at any spot over the overlapping portions; there is no heating in the line of current and pressure; and there is no welding without modifying, for, according to Coffin, an upset would naturally be produced. (See Coffin's Figure No. 1.) The work is not heated by its own resistance; the current for welding is not concentrated by an electrode; the pressure for welding is not concentrated by the electrode; the softened metal is not surrounded by relatively cold metal; the weld is not made quickly; there is no absence of modification in the welding operation, as a burr is invariably formed; during the welding operation the parts do not remain stationary, but one moves toward the other; the electrodes do not remain cold during the welding process, for, in fact, there are no electrodes in the same sense as in the Harmatta process; the size of the weld is not limited and controlled by the size of the electrodes and the amount of current; where there are a number of welds to be made in joining two parts it is decidedly impractical and I might say impossible to make one of these welds at a time, and the weld is always made in full view of the operator.

The process is very similar to the regular heating in a coal fire, the only difference being that the coal or carbon is electrically heated in Coffin's case, whereas in a coal fire it is chemically heated.

Q. 6. Does the German patent to Bernados No. 50,909 describe the subject-matter of the Harmatta patent in suit?

A. Bernardos German patent No. 50,909 does not in any way describe the Harmatta process. This patent describes a process almost identical with that described by Coffin. A hot resistor is brought in contact with the work and it is immaterial to the success of this process whether the current passes across the joint to be attached or not. Figure No. 1 of this patent and Figure No. 6 illustrate the process as carried out when the current does not pass across the joint to be attached. The process pertains more to soldering than it does to welding. The process as applied to soldering is shown in Figures 1, 2, 3 and 6. In Figures 4 and 5 furnaces are provided into which the work to be heated is placed.

The patent differs somewhat from that of Coffin because we are advised that we can make the resistors out of clay, which is practically a non-conductor of electricity, if we give them a slight conductivity by adding to the clay a certain amount of powdered carbon or a certain amount of magnesium or a certain amount of irridium. No matter, however, of what material we make these resistors, the current flowing through them makes them very hot and the work being in contact with these resistors becomes heated by the heat conducted from the resistors to the work. The work is heated in Bernados' case by being in contact with a heated body, the same as the work is heated in a stove by being in contact with the heated fuel.

There is no concentrating of the welding current and pressure at any spot; there is no heating in the line of current and pressure; there is no welding without modification because the outside of the metal must be unduly heated in order to get a welding temperature between the sheets. The work is not heated by its own resistance; a welding current is not concentrated by electrodes; neither is a welding pressure concentrated by electrodes, nor is the metal softened for welding entirely surrounded by relatively cold metal. The weld is not made quickly and there is no absence of modification of the work involved in the welding. In case the work is really welded together there is a movement of one part toward the other part; there are no cold electrodes used in the process and therefore electrodes cannot govern the size of the weld. In case more than one point of attachment is required, it would be practically impossible to make one weld at a time, for the process is a general heating one. When actual welding is done the parts are heated in the electric forge shown at Figures Nos. 4 and 5, and then removed to a suitable hammering or pressing device; the weld, therefore, is always in view of the operator.

The process pertains more to soldering than it does to welding, and throughout the patent the resistors are usually referred to as soldering irons.

Q. 7. Does the Thomson patent No. 496,019 describe the subject-matter of the Harmatta patent in suit?

A. Thomson's patent No. 496,019 has nothing whatever to do with welding and it does not in any way disclose or describe the

subject-matter of Harmatta's patent. The principle of Thomson's process and apparatus are shown in his Figure No. 1, where two soldering irons are placed on opposite sides of the work. These soldering irons are shown at C, C'. The current is passed through these soldering irons for the purpose of heating them, but (page 2, line 16) "it is not necessary in every case to pass the current across the joint from one piece to the other. The current might be passed in the general direction of the line or plane of the joint". The currents used in Thomson's apparatus and machine are very moderate so that the application of this current to the work will not heat it even to the extent of melting a very fusible material, unless this current is first passed through his soldering irons, which are given considerable resistance by making them out of iron (it must be remembered that a soldering iron really consists of copper and that the term "soldering iron" really means a soldering copper), or by making them of copper and facing them with carbon, or by scarring or grooving the contacting surface of the soldering irons (page 2, lines 37–44). Figs. 7 to 15 show Thomson's method of increasing the resistance of his soldering irons. Fig. 18 shows two soldering irons, one placed on each side of the work at C and C'. The contacting surfaces of these soldering irons are roughened as he shows and a train of gears is provided which operates on three screws so that these long soldering irons may be pressed uniformly over a considerable length of the work. Fig. 21 shows a semi-automatic soldering machine where a number of soldering irons are operated in succession so that each may act on a piece of work for a considerable time. As the operation of these soldering irons follow each other one set of soldering irons is always available for placing into the machine a new piece of work. Fig. 21 illustrates that a very moderate pressure is used by Thomson. It also illustrates by the use of the springs *a* that the current is very small. The spring clip in Fig. 22 at C which transmits the current to the upper soldering iron also illustrates the fact that very weak currents are used by Thomson. It is well to note that the current is more concentrated in the cables K, K', the spring clips *a* and the upper contacting brush clip than it is as it passes through the work. The machine is incapable of making a weld, but no doubt would be suitable for soldering, which requires a very much lower temperature and

very much less pressure. In fact, the pressure used in soldering is simply for the purpose of holding the parts in the proper position until the solder sets (page 1, lines 29–32).

The process illustrated in this patent does not differ in any way from the old-fashioned method of sweating the parts together by means of two soldering irons placed on opposite sides of the work, except that the soldering irons are electrically heated.

There is no concentrating of welding current and pressure at any spot. There is no welding without modification or mutilation. There is no welding done at all. The metal of the work is not heated by its own resistance; there is no concentration of a welding current by electrodes, nor is there a concentration of a welding pressure by electrodes; the metal softened and melted for the purpose of attaching the parts together is in contact with metal at the same temperature. The operation is carried out very slowly and requires a long time to wait for the parts to cool before they can be released from the soldering machine, for Thomson tells us this pressure (page 1, line 30) "must be continued and the pieces held rigidly during the cooling or setting of the solder". The melting of the solder and its necessarily accompanying extrusion constitutes a modification during his processing and causes the parts to necessarily move closer together to replace the molten solder. The soldering irons necessarily are heated and special means are provided for causing them to heat. As the process occupies considerable time, the work becomes generally heated and it would be impossible to form separate points of attachment anywhere near each other, the size of the attachment not being subject to any nice or definite limits. The work must be prepared for processing by providing solder or by coating the parts with a suitable flux.

This patent has nothing to do with welding and does not contain the necessary qualifications and characteristics of the welding process.

Q. 8. Does the Blanchard patent No. 466,266 describe the subject-matter of the Harmatta patent in suit?

A. Blanchard's patent No. 466,266 does not in any way describe or disclose the subject-matter of Harmatta's patent. The process is clearly indicated in Blanchard's Figure No. 1, which shows a rivet placed between two electrodes. A current passes from one electrode to the other through the rivet. The object of the patent is

simply to provide a means of heating a rivet. The patent has nothing whatever to do with welding, and an analysis of the patent would be superfluous. It deals with the heating of a rivet, the very article the use of which is avoided by the Harmatta invention. There is only one property in this patent which shows any similarity to Harmatta, and that is the work is heated by its own electrical resistance, but in Blanchard's case the heat is not carried to anywhere near the welding temperature. Otherwise, the patent differs in every conceivable respect.

Q. 9. Does the Lemp patent No. 531,197 describe the subject-matter of the Harmatta patent in suit?

A. Lemp's patent No. 531,197 does not in any way describe the subject-matter of Harmatta's patent.

Lemp provides a process for annealing armor plates. It is more convenient in the manufacture of armor plates to harden the whole plate in its process of manufacture. It is sometimes required, however, that during fabrication holes must be provided in this hardened armor plate, and in order to provide these holes the armor plate must be softened. If the whole plate were softened the plate would be of no use, and it must be softened locally just where the hole is to be placed. Lemp provides a machine for doing this work of locally softening the armor plates which he illustrates in his Figure No. 1. A transformer is provided, as shown at A, with extended terminals B, B. When the transformer is placed on the work it rests, so to speak, on these extended terminals, the weight of the transformer serving to act as a pressure to hold these terminals in contact with the work. In order that this transformer may be handled conveniently an overhead crane is provided, as shown in Figure No. 1. The current passes from one of the terminals to the other through the work. The terminals are rigidly set in relation to each other, so that it would be impossible in Lemp's machine to pinch the work between the terminals, and although Lemp shows a construction in Figure No. 4 where the current is passed through the work, yet no means are indicated of pressing the work between the electrodes, which would be necessary in welding. Lemp's patent does not contain these welding features, because it is not intended for welding, and the word "weld" does not appear in the whole specification. The current

used by Lemp is not sufficient for causing a weld; neither did Lemp realize that the current when increased to a sufficient amount to weld would remain concentrated as it passed through the work, for he warns us not to increase the current unduly or in a sufficient quantity to cause a weld, for in so doing the current will distribute itself throughout the work and prevent a local heating. According to Lemp (page 2, lines 89-96), "In order to prevent the current from spreading too much and heating the metal beyond the desired zone of softening care should be taken not to use too heavy or powerful an electric current. This is particularly the case where the attempt is made to pass the current through the metal from one side of a plate to the opposite side." In other words, Lemp was entirely ignorant of the property of the electric current to stay condensed as it passed through the work, the very property on which Harmatta's invention was founded. Lemp tells us (page 3, line 101) "the electrodes or contacts where they engage with the mass of metal are made rather small". He further tells us (page 2, line 100) "each copper contact being about one inch square". This size contact might have been very small according to his ideas on annealing, but such a contact would have been extremely large, considering Harmatta's views on spot welding. In fact, Lemp's small contact would have been too large for Harmatta's spot welding, owing to the fact that sufficient current for Harmatta would not have been available. Even at the present time, no spot welding has been accomplished with electrodes having a bearing surface of one inch square, and bearing directly on the work. The point I wish to bring out in connection with Lemp's patent is, in case someone had conceived the idea of an "electric rivet" and had attempted to use Lemp's machine for the purpose of demonstrating his conception, he would have found the machine entirely worthless for the purpose.

There is no concentration of welding current and pressure at any spot in Lemp's process. In fact, there is no welding at all. From Harmatta's standpoint, there is really no concentration of current by welding electrodes; nor is there any concentration of a welding pressure. The metal is not brought to a welding temperature, but simply heated for the purpose of annealing. Lemp's process has for its object a modifying or changing of the work from a hard to

a soft condition; that is, the annealing of the work. In fact, the whole process of Lemp has nothing whatever to do with the "electric rivetting" process of Harmatta.

(Adjourned to Wednesday, November 13, at 10 A. M.)

BOSTON, November 13, 1918, 10 A. M.

Met pursuant to adjournment.

Present, counsel as before.

Q. 10. Does the Burton patent No. 647,694 describe the subject-matter of the Harmatta patent in suit?

A. The Burton patent No. 647,694 does not in any way describe the subject-matter of the Harmatta patent.

Burton invented a machine for carrying out the regular blacksmith's operation of welding and he tells us (page 1, line 14) "the invention is especially adapted for lapped welding". He then goes on to describe the advantages of the regular blacksmith's method of lapped welding over the blacksmith's method of butt welding. He tells us (page 1, line 16) "the lapped weld is superior to the butt weld. No end pressure is required and consequently there is no upsetting of the metal and no formation of a bulge or projection at the joint, which is afterwards required to be filed or hammered down". These facts were well known to every blacksmith prior to Burton's invention and are simply mentioned by Burton to describe the uses to which his machine could be placed. This is entirely corroborated in the following parts of his specification. He tells us (page 1, line 22) "the object of the invention is to provide a simple, convenient, compact apparatus for the use of a *blacksmith* or other worker". He then goes on to describe (page 1, line 91) that a blacksmith loses considerable of the heat in the work in transferring his work from the forge to the anvil, but that his invention avoids this loss of heat in carrying the work from the forge to the anvil because he mounts his heating forge directly on the anvil.

Burton illustrates his entire apparatus in detail in his Figure No. 1, where he shows the apparatus in the act of heating the ends of a bent strip or tire. When these ends have become sufficiently heated by his apparatus he shows by the dotted lines how this tire

is transferred to the face of the anvil and hammered in the regular blacksmith's way by a hand hammer.

The apparatus consists of a dynamo 20 which is separately excited by the smaller dynamo 90. The current from the main dynamo passes through the conductor 140 to the switch 130 and then by a hinged arm 150 to a turret or revolving hub 200. This hub is provided with a number of regular blacksmith's tools arranged radially around this hub. Any one of these tools may be selected by the blacksmith and placed in operative position, which is the downward position, or that position occupied by the tool 210. A foot lever is provided to act as a pedal for operating the hinged bar so that the selected tool may be pressed by the foot into contact with the parts to be heated. A tool designed to coact with the turret tool is rigidly mounted on the blacksmith's anvil. This tool is shown at 100 in Figure No. 1. The tool rigidly mounted on the anvil is connected with the other pole of the main dynamo. Burton tells us that the electrode or tool which is rigidly mounted on the anvil is of copper (page 1, line 104) and that the conductor leading from this electrode to the dynamo is of copper (page 2, line 20), and that the hinged bar shown in Figure 1 at 150 is of good conducting material (page 2, line 45), but nowhere does he advise us that the tools mounted on the turret are of copper or of good conducting material.

Burton's machine is purely an electric heater; no welding is intended to be done while the parts of the work are between his heating tools. He tells us (page 2, line 78) "as soon as the piece is heated to the proper temperature which may be ascertained by inspection thereof the operator releases the foot lever and the spring 170 lifts the hinged lever 150 and takes the upper electrode out of contact with the work, whereby the circuit is broken". The work now has attained a sufficient temperature so that now "the operator may shove the work forward on the anvil and hammer the joint, or otherwise finish it as desired". Of course before the work has attained this high temperature the operator may not shove his work forward on the anvil, as it would be impossible to weld it. The great thought in Burton's mind seems to be to get the heating apparatus as close to the anvil as possible so that no time will be lost between the heating of the work and the hand hammering o

the work. After telling us that the work has become heated and has reached the stage where the operator may shove his work forward on the anvil, he tells us that "in this way the heating can be quickly and conveniently effected [note that he does not say welding] on the anvil without loss of time and heat and without forming an objectionable bulge in the work".

This bulge referred to by Burton is well understood by every blacksmith. When two bars are heated and placed in abutment it is necessary to apply longitudinal pressure to the parts, as otherwise the weld cannot be subjected to pressure, which is of course necessary in a true welding operation. This pressure of course tends to bulge the work at the joint. If, however, we scarfe or chamfer off the edges of the bars and lap the joint, this end or longitudinal pressure will be of no avail as by it no pressure can be exerted at the joint. The lapped joint requires a transverse pressure. This transverse pressure tends to make the joint thinner instead of bulging it, as is the case with the longitudinal pressure. In order to prevent this thinning the blacksmith laps his joint in such a way that the joint is thicker when starting the pressure on it so that on completing the pressure or hammering the transverse pressure, which is usually applied with a hammer, thins down this thick joint to the original section of the material.

The formation of this lapped joint was understood by Burton, as it will be noted in his Figures Nos. 1 and 2 and also Fig. 11, that he does not allow the scarfed portions of the work to contact, but heats them in a disengaged position so that when the work is transferred from the heating device to the anvil he may overlap the pieces so that they are thicker at the joint, so that when they are hammered on the anvil as shown by the dotted lines in his Figure No. 1, the joint will be thinned down to the original section of the material on which he is operating.

Burton's machine is simply an electric heating device in which the work is generally heated at or near the place to be welded. In order to do this, he passes the current across the two ends of the work in practically a transverse direction to the joint. He tells us (page 2, line 73) "the current passes through the work in transverse direction across the overlapping ends of the parts to be heated" (note that he does not say the parts to be welded). This

he illustrates in many of his figures (Fig. No. 1, Fig. No. 2, Fig. No. 11, Fig. No. 12). It is evident from these figures that although he passes the current "through the work in transverse direction across the overlapping ends of the parts to be heated" he does not pass the current across the joint.

Even when a butt weld is to be made, as the seam of a tube, the parts to be welded are not placed in contact in his heating device. It should also be noted that the whole tube would become heated and not just the seam which is to be welded, in fact, the tube would be heated just the same as if it had been placed in the ordinary blacksmith's forge. Different shapes of work require, according to Burton, different shaped tools. Some of the uses of these tools are indicated in his Figures Nos. 3 to 13. Figures Nos. 3 and 4 show his idea of a tool for countersinking screw holes (page 1, line 35). Figure No. 7 shows the tools used for lapped welding two sections of pipe of different sizes.

It should be noted that Burton has failed to grasp the fundamental principles of electric welding; for instance, Prof. Thomson tells us in his original patent on the subject (patent No. 347,140, page 3, line 10) that the resistance of the work should be a large fraction of the total resistance of the welding circuit. Burton's Figure No. 1 illustrates that this is not the case. Observe the long conductors reaching from the dynamo to his heating device; observe the many joints in the circuit; observe the slender arm connecting his various tools with the revolving hub or turret; and observe how he spreads out the current as it passes through the work. It would be impossible in this construction to have the work a large fraction of the total resistance. Burton's Figure No. 1 shows that the work constitutes but a small fraction of the total resistance of the welding circuit.

Burton's patent does not even disclose "electric welding", let alone Harmatta's improvement in "electric welding".

Burton does not show any means of concentrating a welding current and welding pressure at any spot over the overlapping portions of his work; he does not show a method of electric welding without modifying or scarring the material. The current is not concentrated by means of electrodes; the welding pressure is not concentrated by means of the electrodes; the metal softened for

welding is not entirely confined by relatively cold metal, and from an electric welding standpoint Burton does his welding very slowly. Burton more or less modifies or mutilates his work (compare Burton's blacksmith's weld with the Harmatta spot weld). The parts being welded do not remain stationary throughout the welding operation, for not only is the work moved from the heating device to the anvil, but the hammer blows force one part of the work bodily toward the other part. The size of Burton's weld is not limited by the contacting areas of the electrodes, nor can it be varied by varying the amount of current. In case more than one weld is desired between the overlapping parts Burton could not make one weld at a time. It should be noted that when Burton makes lapped welds the work is subjected to a preparatory modification, that is, the work is scarfed as shown in Figures No. 1 and No. 2. Burton's weld is not hidden from view, but is made within full view of the operator in exactly the same manner as is employed by all blacksmiths on an anvil. The apparatus is allowed to heat the work gradually until it attains the proper temperature and (page 2, line 78) "as soon as the piece is heated to the proper temperature, which may be ascertained by inspection thereof, the operator releases the foot lever and the spring 170 lifts the hinged lever 150", etc.

Burton's object is not to form a weld which will take the place of a rivet, for if this was the case Burton would not show, in his Figure No. 13, how his apparatus can be applied to riveting, neither would he show the arrangement of the work like it is in his other figures, for in no case illustrated by these figures could a riveted construction be used with any degree of commercial satisfaction.

Burton's machine and methods simply illustrate or show a method of substituting a blacksmith's forge by an electric heater, and do not in the slightest way disclose or suggest Harmatta's method of producing "electric rivets".

Q. 11. Does Thomson's patent No. 396,015 describe the subject-matter of the Harmatta patent in suit?

A. Thomson's patent No. 396,015 does not in any way disclose the subject-matter of Harmatta's process. This is practically evident on the face of the Thomson patent, for why should Thomson

patent a method of rivetting if a method to avoid rivetting as shown by Harmatta was in his mind?

Thomson tells us that his invention (page 1, line 8) "consists essentially in a method of riveting by placing the rivet or rivet blank in position in the socket or hole designed to receive it, passing through said rivet an electric current of sufficient volume to heat the same to the requisite temperature and then setting the rivet in its position by endwise pressure or other means employed in the ordinary riveting operations". In other words, Thomson's method of electric rivetting is the same as the ordinary method of electric rivetting with the exception that the rivet is heated after it has been passed through the work which it is to attach together.

Thomson's process and apparatus are shown in their simplest form in his Figure No. 1. After providing a through hole in the parts to be attached, the rivet blank is placed through these parts and placed between two rivet-setting tools G and E (Figure No. 1). These rivet-setting tools are made the terminals of an electric circuit by being in metallic contact with the conductors C and C', which constitute the arms of the machine and which in turn are respectively connected with D and D', the cables which connect to the source of current. The current flows from one setting tool to the other through the rivet blank to be heated. This heating of the rivet blank of course causes it to soften so that it may be easily set by exerting pressure between the setting tools by means of the hand wheel W operating on a screw. This method carried out as described by Thomson produces exactly the same results, but in a more convenient way, as if the rivet had been heated in a regular blacksmith's forge and inserted through the sheets in this heated condition and set by the setting tools shown in Figure No. 1.

The method, however, may be elaborated on so as to produce an effect which would not be possible by heating the rivet before it is placed in the work. According to this elaboration (page 1, line 25), "the current may be allowed to pass for a longer period and until the central portion of the rivet, as well as the metal near thereto, is raised to a welding temperature, when the application of pressure expanding the rivet in its seat will weld the same to the metal surrounding it and the application of the pressure to the pieces to be riveted will weld them together around the rivet";

(page 2, line 28) this "valuable effect not possible in other processes may be obtained by a method of riveting by continuing the heating of the rivet blank placed through the hole for some moments longer than it is necessary to raise it to a softening temperature. By conduction the heat is carried to the portions of the plate surrounding the rivet, raising such portions to a welding temperature, and when the rivet is pushed firmly into the hole a partial welding of the rivet to the sides of the hole is effected, thus forming practically solid metal for a portion of the distance from D to D'" (Figure No. 6).

These effects of welding the rivet to the sides of the hole are effected by the machine illustrated in Thomson's Figure No. 1.

It will be noted that in Figure No. 1, prior to the application of the pressure which upsets the rivet, there is nothing to hold the plates in overlapping contact and in case the work is of a springy nature there is danger of the rivet being upset between the sheets instead of on the outside of the sheets. Thomson therefore provides pressure plates for holding this work together prior to the time that the rivet is upset. One form of his device using pressure plates he illustrates in Figure No. 9. As these pressure plates are more satisfactorily made out of metal than any other material and as a satisfactory construction makes these pressure plates contact with the parts of the machine which convey the current to the setting tools they naturally will conduct the current directly into the work. In the construction shown in Figure No. 9 this short circuiting of the rivet by the pressure plates is avoided by inserting insulation m, m' between the pressure plates and the work. Thomson tells us that (page 2, line 68) "By the use of this form of apparatus a heating electric current might be passed through the metal plates themselves at parts *around* the rivet" by removing the mica pieces m, m' from between the pressure plates and the work. "Such current would *assist* in raising the portion of the plates immediately around the rivet to a welding temperature." According to Thomson's description, it would be supposed that the pressure plates were of a circular shape so as to press the plates together all the way around the rivet. This view is corroborated by Thomson's description where he tells us (page 2, line 61) that these pressure plates are forced hard against the work. If the mica m, m'

is removed from between the pressure plates and the work and the pressure plates K be screwed up hard against the work, this hard pressure would bend the plates, if we consider Figure No. 9 a working drawing, as the bi-forked members of the pressure plates would not come opposite each other. Figure No. 9 therefore is more of a diagram than a working drawing and practically illustrates the pressure plates in sections, in the same way that Figure No. 10 illustrates the pressure plate K^2 in section. Referring again to Figure No. 9, the pressure plate K^1 is made integral with the arms of the machine. The pressure plate K is a heavy clamping piece which passes through the left-hand arm of the machine and on which the screw S^1 is turned, so that it may be made to approach or recede from the work by rotating it. According to Thomson (page 2, line 57) the piece K in Fig. 9 is not a composite body, but a single clamping piece provided with a screw which is cut on the piece K itself.

It should be noted that the pressure plates K and K^1 bear on the work at some distance from the rivet and not "immediately surrounding the rivet".

Thomson tells us that (page 1, line 25) the rivet may be welded to the sheet and that the sheets themselves may be welded together immediately around the rivet. This he illustrates with Figures Nos. 6 and 7. It should be noted that the welding together of the two plates occurs immediately around the rivet and that the heat required for raising these plates to a welding temperature is obtained by conduction from the heated rivet blanks. When the pressure plates are used the heat generated between these pressure plates which are remotely located from the rivet generally heats the plates at a remote circle around the rivet and prevents to some extent the escape of this heat conducted from the rivet. As the heat being conducted from the rivet is to some extent prevented from escaping by this circle of heat remotely located from the rivet it is easily seen that the current flowing between the pressure plates (page 2, line 73) "would assist in raising the portion of the plates *immediately surrounding the rivet* to the welding temperature".

Thomson illustrates in his Figures Nos. 6 and 7 where the welding between the two plates occurs, which is *immediately around the rivet*, but when we examine Figures Nos. 9 and 10 we find that the

pressure plates do not bear on the work *immediately around the rivet;* therefore the weld between the two plates does not occur between the pressure plates, or if we consider the pressure plates as electrodes the weld does not occur between these two electrodes.

Figure No. 10 illustrates a modified form of pressure plate which is made to bear on the work by means of the spring S. This pressure plate is tubular in shape and is shown in the drawing in cross-section. Thomson tells us that pressure is applied to this pressure plate K^2 by means of the spring S S. If we examine the drawing with the idea that the top pressure device is a distinct and separate piece from the lower pressure device, we find that the spring does not make contact with the part of the pressure device marked K^2, and it therefore would not bear on the work with any sure pressure. It is therefore plainly evident that the pressure device K^2 is tubular in shape and shown in cross-section. In fact, Thomson tells us that the clamping devices on each side of the work are heavy single pieces.

These clamping devices have no tendency to concentrate the current and in fact the current is more concentrated if it was allowed to pass through the rivet blank without the use of or by insulating the pressure plates.

Thomson's idea when welding in connection with his riveting is to supply the entire welding heat in the sheets by conduction and not generate this heat in the sheets themselves by their own resistance at the place where they are welded. Read what Thomson says (page 2, line 33): "By conduction the heat is carried to the portions of the plates surrounding the rivet, raising such portions to a welding temperature."

When considering the welding phase of Thomson's patent the rivet acts as a resistor for generating the heat used in welding the plates together. The process, therefore, is not an electric welding one and has nothing to do with "electric welding". There is no concentrating of welding current and a welding pressure at any spot over the overlapped portions; the welding must be confined entirely to immediately around the rivet. The plates heated for welding are not heated in the line of current and pressure. There is no welding without modifying the material, for his welding is always accompanied by the upsetting of a rivet. The parts of the

plates which are welded are not heated by their own resistance at that point. The current for welding is not concentrated by means of electrodes and the pressure for welding is not concentrated by means of electrodes. The metal of the plates which are softened for welding is not surrounded by relatively cold metal, but lies in contact with the highly heated rivet. When welding occurs it occurs slowly; that is, the current is allowed to pass for a longer period than when the rivet is simply headed without the accompanying welding operation (page 1, lines 25, 26). The work is always modified when a weld occurs; that is, the rivet must be upset. The size of the weld is not governed by the contacting area of the electrodes and the size of the weld cannot be varied by varying the amount of current. One weld cannot be made at a time, for it is always necessary that the rivet weld to the sheets at the same time that the sheets themselves are welded together. A preparatory modification of the work is always necessary in that holes must be provided and rivet blanks supplied.

The process has nothing whatever to do with Harmatta's idea of substituting a rivet by an electric weld, which is evident on the face of Thomson's patent, which is a method of electric riveting.

Q. 12. Does the Thomson patent No. 347,140 describe the subject-matter of the Harmatta patent in suit?

A. Thomson's patent No. 347,140 does not describe the subject-matter of Harmatta's patent.

This is the fundamental patent of the art of electric welding in which the term "electric welding" is coined, to describe the process and its characteristics. If we grasp a bar of metal in each hand near the ends of the rods and then press the two ends together, that is, abut them, we follow out the mechanical principle of Thomson's butt welding machine. In Thomson's machine each rod is gripped near its end by a clamp or a vise and the rods are kept in alignment in abutting position. The clamps or vises are the terminals of an electric circuit, so that the current passes from one clamp to the other through the projecting ends of the work to be welded. This is shown in Thomson's Figure No. 1, where K and K' are the clamps or vises mechanically mounted on the arms L and L' and the two clamps are forced together by means of the spring S. The work in this figure consists of rods or wires to be

welded together and are shown at W, W'. The work is allowed to extend through the clamps forming slight projections as shown at J. The current passes from the conductor C, which is attached to a source of current, through the arm L, to the clamp K' (which in the drawing is shown removed), through the abutting portions of the work to the clamp K, thence through the arm L and conductors C, back to the source of current. It will be noted that nothing is applied to the work except electricity and pressure and all the heat used for welding is developed directly in the work itself due to the passage of the current through the work. As the development of heat by electricity depends on the resistance of the conductor through which it is flowing, Thomson makes the resistance of the work a large fraction of the total resistance of the welding circuit (page 3, line 11). The passage of the current through the work causes the work to heat and when it becomes softened the two clamps holding the work are forced together, so that one part of the work moves bodily toward the other part of the work (page 2, line 5). This approach of one part of the work to the other part causes an upset or burr (page 2, lines 24, 25). Thomson tells us that "the burr can easily be filed off or ground off". According to Thomson (page 2, line 115) the process does not act quickly enough to disregard the thermal characteristics of the two parts being united and in case we are to weld a large rod to a small rod the large rod must be machined down where it projects from the clamp to the same area as the small rod.

Thomson's process does not contemplate arranging the work so that it can be rivetted, as all the joints he has in mind are butt joints and incapable of being rivetted with any degree of commercial satisfaction. There is therefore no thought of an electric rivet or a weld to take the place of an electric rivet in Thomson's mind. It is the entire contacting surface between the parts of the work which are welded.

The object of Thomson's process is therefore entirely different from the object of the Harmatta process. Thomson does not propose a weld to replace a rivet because he is dealing with conditions under which there cannot be rivetting. He does not overlap the parts to be welded, but butts them. He does not concentrate a welding current and a welding pressure at any spot in overlapped

portions of his work. He does not weld without modication as his process invariably produces a burr or upset. The current for welding is not concentrated by his vise-like clamp electrodes. He does not concentrate the welding pressure by his electrodes. The metal softened for welding is not surrounded by relatively cold metal, and according to Harmatta's idea of welding the weld is made very slowly so that the thermal characteristics of the two parts being welded must be considered, and if one part is large and the other small, the part of large section must be reduced where it abuts the piece of small section. The work is modified during the welding process by the formation of the burr or upset. The work does not remain stationary during the process but one part bodily approaches the other part. The size of the weld is not limited by the contacting area of his vise electrodes and it would be impossible according to Thomson to make small single welds one at a time between the surfaces in contact. During the welding operation the weld is within full view of the operator and is not hidden by being entirely surrounded with cold metal.

Although Thomson's patent is a true case of electric welding, it in no wise discloses the subject-matter of Harmatta's patent.

Q. 13. Does the Thomson patent No. 347,141 describe the subject-matter of the Harmatta patent in suit?

A. This patent does not in any way disclose the subject-matter of the Harmatta patent and as far as my criticism goes is entirely covered by what I have said of Thomson's patent No. 347,140. And what I have said about Thomson's patent No. 347,140 is equally true of Thomson's patent No. 347,141.

Q. 14. Does the Robinson patent No. 574,942 describe the subject-matter of the Harmatta patent in suit?

A. Robinson's patent does not in any way describe the subject-matter of Harmatta's process.

Robinson's patent does not describe really any process or any machine, but does describe a special form of rail joint. Each rail is provided with an extending fish plate or connecting plate and these fish plates are placed on opposite sides of the rails to be united. The two rails are then placed together in dovetail fashion and the joint is finally completed by binding the whole assembly together with bolts. The members to be united to the rails are provided

with projections shown at *d* in Figures Nos. 1 and 2 and at *i* in Figures Nos. 11, 12, 13, 14, 15, 16, 18 and 20.

The fish plates are assembled against the rails but separated from the rails by the projecting portions. According to Robinson (page 2, line 24), when the current is turned on these projecting portions and the part of the rail where they contact are brought to a welding heat and (page 2, line 32) "when the contact points and the corresponding points of the bottom of the rail have reached a welding heat the plate B and the rail A are rigidly clamped together to produce the weld".

Robinson does not describe how this is to be accomplished, but his proposition is to weld the ends of the projections butt on to the flat sides of the rail. His process, therefore, is a butt welding one in which he takes no account of the thermal characteristics of the two parts being welded, like Thomson does. It is therefore a question whether his construction would be commercially operative. The process is not one designed to replace a rivet by an "electric weld" for his welds are placed at the extreme edge of the fish plate where a rivet would never be used. (See Figure 20.) The welding is not unaccompanied by a modification, for the projecting parts flow or are upset, and his work is especially designed to provide room for this upset (page 1, lines 66–90). According to Robinson, the current for welding is not concentrated by the electrodes. Neither is the pressure used for welding concentrated by the electrodes. The metal softened for welding is not entirely surrounded by relatively cold metal. (See Figure 20.) There is no lack of modification involved in the welding, for Robinson's weld is always accompanied by an extrusion or flowing of the metal (page 1, lines 66–90). The parts being welded together do not remain stationary with relation to each other during the welding operation, as the projection heats and becomes softened and allows the members to approach nearer to the rails. The size of Robinson's weld is not limited by the contact area of the electrodes; neither can the size of the weld be varied by varying the amount of current. As Robinson is dealing with heavy plates all his welds which unite these plates to the rails must be made at the same time (page 2, line 32). According to Robinson, his work is subject to a preparatory modification by forming projections on one of the parts to be welded;

that is, he forms projections on the fish plates. Owing to the fact that the projections separate the two main bodies being welded the weld can be made in the view of the operator, by looking endwise at his work, as shown in Figure No. 20. I can see no suggestion of the subject-matter of the Harmatta process in Robinson's patent.

Q. 15. Does the Kleinschmidt patent No. 616,436 describe the subject-matter of the Harmatta patent in suit?

A. Kleinschmidt's patent No. 616,436 does not describe in any way the subject-matter of Harmatta's patent.

Kleinschmidt describes an apparatus and a process of welding splice-bars to rails for the construction of what is known as continuous track welding. These splice-bars are shown in Figure No. 2 and are provided with projections *b*, *b*. Two of these splice-bars are arranged one on each side of the rail with the projections or bosses in alignment, as shown at B in Figure No. 1. These splice-bars are pressed firmly against the rail by push-blocks which are made the terminals of a transformer, shown at C in Figure No. 1. The current therefore passes from one push-block to the other through the assembled work. The operation is really a case of butt welding two rods together with a web of metal interposed between the abutting ends of the rods, Kleinschmidt's bosses or projections constituting the rods. Like in butt welding, the current is passed longitudinally through the projecting bosses, and like in butt welding there is an upsetting action (page 1, line 84).

According to Kleinschmidt, there is no concentrating of a welding current and a welding pressure at any spot over the lapped portions, as this concentration of current pressure is pre-located by the position of Kleinschmidt's projections or bosses. There is no welding without modification, as the process is always accompanied by an upsetting action (page 1, line 34). The current is not concentrated by the electrodes, neither is the pressure used for welding concentrated by the electrodes. The metal softened for welding is not entirely enclosed by relatively cold metal. The process entails considerable time (page 1, line 92). There is a modification of the work involved in the welding process; that is, the bosses or projections are upset and reduced in height, and owing to this upsetting action the splice-bars move bodily toward the rails during

the welding operation. The size of the weld is not limited by the contact area of the electrode; neither can the size of the weld be varied under this limit by the amount of current. According to Kleinschmidt, one weld cannot be made at a time, as there is a weld on each side of the rail, constituting two welds, both of which must be made at the same time. There is a preparatory modification of the work required: that is, the splice-bars must be provided with projections. If the operator desires to watch the progress of his welding he may look endwise at his work, obtaining the view as shown in Figure No. 1.

Kleinschmidt's idea and object was not to provide an electric weld to take the place of a rivet, but to provide a means of rigidly holding two rails together which depended on the contracting and expanding of the splice-bar due to the heating effect, and has nothing to do with Harmatta's idea of an electric rivet and his means for obtaining the same.

Q. 16. Does the Thomson patent No. 444,928 describe the subject-matter of Harmatta's patent in suit?

A. Thomson's patent No. 444,928 does not describe in any way the subject-matter of the Harmatta patent.

This patent describes a process which is known to the trade as "lapped seam edge welding", and the whole principle of the invention is disclosed in Thomson's Figure No. 1. Two rolls are provided R, R', and located in suitable housings F, F' and by means of these housings kept in alignment by the base D. The hand screw S enables the two rolls to be pressed together. The work, consisting of two plates or sheets which are to be continuously attached along their edges, are lapped along the said edges and introduced between the rolls as Thomson shows in his Figure No. 1. As the work is fed between the rolls the current passes from one roll to the other through the overlapped edges of the work. This current heats the work across the overlapped portions and the rolls which are firmly pressed together supply the necessary pressure. The weld once started at the beginning of the sheets progresses along the edges of the sheets until the other end of the sheets is reached.

According to Thomson, the work must be properly arranged between these rolls (page 1, lines 33, 34) and a practical demon-

stration of the process clearly demonstrates this, for if the sheets are lapped too much insufficient heat will be produced to form a weld, and if they are not lapped enough the metal will be too highly heated. The process requires very expert care and is therefore limited in its commercial application, as it is necessary to keep the edges just slightly overlapped in a uniform manner the whole length of the seam, which is almost impossible in commercial work. Thomson refers to this in his specification (page 1, line 84). "In Figure No. 1", says Thomson (page 1, line 78), "I have illustrated the application of my invention to the welding of the edges of two plates M, M' together, the plates being shown in end view as in position between the rolls *ready* to be fed between them in the longitudinal direction of such plates." In other words, these plates are ready to be welded but are not yet welded, the current not having been yet turned on, as otherwise the plates would have been shown as forced into each other. This is also true of Figures Nos. 2 and 3. When Thomson's machine is actually welding the metal is actually softened and the screw is given a few turns so that the thickness of the seam is practically the thickness of one plate only and not the two plates as shown in his figures (page 1, lines 88–94). In Figure No. 1 it will be noted that the lapped portions of the plates are very slight (page 1, line 84) and well within the width of the rolls. The current, therefore, flowing between the rolls must concentrate itself to pass across this small overlap. No matter how much larger the rolls are made across their faces and no matter how much smaller the faces of the rolls are made, provided that they extend beyond the extreme edges of the work, this concentration of the welding current will not be effected. This is likewise true of the welding pressure; it is this lapped portion where one part of the metal is superimposed on the other part of the metal, and it is the superimposed portion which reacts against the pressure exerted by the rolls. No matter how large or small the faces of the rolls are made, provided, however, they are not made smaller than the overlap, this pressure used in the welding is concentrated by the overlap and not by the face of the rolls. This process of Thomson's is one of motion, for a continuous welding process; Harmatta's process is one of rest. Thomson keeps a heated spot continuously between his revolving elec-

trodes and feeds the heated spot along the seam to be welded. Harmatta's heated spot lasts but a moment.

According to Thomson there is no concentration of the welding current at any spot over the overlapped portions, as the entire lapping portions become heated. There is no welding without modification, as one part is forced into the other part, resulting in a burr or upset as it comes under the rolls. According to Thomson, the current for welding is not concentrated by the electrodes. The pressure for welding is not concentrated by the electrodes. The metal softened for welding is not entirely enclosed by relatively cold metals, for as the process is a progressive one that point which is being welded is in direct contact with the hot portion which has just been welded, and then too the edges of the work are not in contact with cold metal. The weld considered as a whole is made slowly as it requires considerable time to complete this long weld; the heat located between the rolls is maintained for a long period or until the seam is finished. There is a modification of the work involved in the welding; that is, one part is pressed into the other part so that the finished seam, although made up of the metal of the two plates, is reduced in thickness to very nearly the thickness of but a single plate. The parts therefore move toward each other in the welding operation and therefore cannot be considered relatively stationary. The size of the weld produced in this Thomson patent is not governed by the contact area of an electrode; neither can the size of the weld be varied by varying the amount of current. We can hardly say that one weld is made at a time, as in Harmatta's case. Harmatta's weld we might say is made instantaneously, whereas Thomson's is made progressively. Thomson's weld occurs at the extreme edges of the plates and can be easily viewed by the operator while he is making it.

Although this patent shows a true electric welding process, it does not in any way disclose Harmatta's idea of an "electric rivet" or the subject-matter of Harmatta's patent.

(Adjourned to Thursday, November 14, at 9.30 A. M.)

BOSTON, MASS., November 14, 1918, 9.30 A. M.

Met pursuant to adjournment.

Present, counsel as before.

Q. 17. Does the Lemp patent No. 553,923 describe the subject-matter of the Harmatta patent in suit?

A. Lemp's patent No. 553,923 does not disclose the subject-matter of Harmatta's patent.

Lemp tells us (page 1, line 13) that "the object of my invention is to provide a more thorough and uniform heating of the work in the operation", and that the (page 1, line 22) "invention is especially applicable to a metal forming operation consisting in the forming of long joints between strips, plates, bars or rods, such as boiler plates or other articles". He further tells us that his invention is especially adapted (page 1, line 27) to welding, soldering, cementing or similar operations and also to simple shaping, rolling or forming of a metal rod, bar or strip which is fed continuously between the forming pressure devices. He tells us (page 1, line 15) that "the invention consists in applying to the metal heating currents of different frequency during the manipulation thereof".

According, therefore, to Lemp's own description, his invention is in the category of electric heating for welding, rather than simple electric welding.

The simplest form of Lemp's invention, that is, the form in which it is most easily understood from an electrical standpoint, is illustrated in Lemp's Figure No. 4 where A and A^1 represent two transformers placed on opposite sides of the strips of metal to be operated on. These transformers have secondaries B and B^1 which terminate in roller electrodes D, D^1, D^2 and D^4 which bear on the strips. The polarity of these secondaries is so arranged that currents flow longitudinally through the strips as indicated by the arrows; that is, a separate current is passed through each strip. The object of this longitudinal current is to heat the strips for a subsequent operation. After the strips have become heated by being run between the terminals of these transformers, they pass between the terminals of a second set of transformers, shown at A^2 and A^3. This second set of transformers is mechanically arranged in a similar manner to the first, but the polarity of the secondary

terminals of these transformers are so connected that the currents pass transversely through the heated strips. The terminals D^1 and D^2 of the second set of transformers further heat the work. The last set of terminals D^4 and D^5 applies the welding pressure to the preheated work.

After securing an apparatus to produce the effect he desires he proceeds to simplify the mechanical construction of the machine without altering its electrical principle. This he does by combining the terminals D^1 and D^2 of his first set of transformers, A and A^1, with the terminals D^1 and D^2 of the second set of transformers, A^2 and A^3, and by replacing the rolls which are only used for transmitting the current to the work by electrical brushes. This simplification of the machine Lemp illustrates in his Figure No. 3. Lemp further develops his idea to produce a still simpler machine which he illustrates in Figure No. 5 where he actually combines the two sets of transformers to give the same result as in his previous machine. This he does by providing each of the transformers with two primary windings, each set of primaries being connected with a different source of alternating current. These two sources of alternating current differ in frequency (page 1, lines 16–18). The use of these two alternating currents which differ in frequency results in the formation of two currents in the work, one current acting for the first instant and the second current acting for the second instant, following each other continuously in rapid succession. The result of this is that one current flows longitudinally through the work as illustrated by the arrows in Figure No. 5 and the other current flows transversely through the work, for instance, between D and D^2 and between D^1 and D^3. In the most highly developed form of Lemp's invention it will be noted that the pressure devices shown at D^5 and D^6 are not made the terminals of an electric circuit and are entirely separate from Lemp's electric heating machine, which emphasizes more than ever the fact that the object of his invention (page 1, line 13) "is to provide a more thorough and uniform heating of the work".

Lemp's idea is to make each part of the work hot throughout its whole body and his figures illustrate narrow strips, one laid on top of the other, that is, side by side and not lapped just on their edges, and to provide rolls and brushes to extend across the full width of

the strips. This is clearly indicated by Lemp where he describes how his currents are to be regulated when welding strips together of different widths and thicknesses. Lemp tells us (page 3, line 28) "in Figure No. 5 [which shows Lemp's most refined design] R and R' are such regulating devices so that if it is desired to weld stock of a large section, a heavier longitudinal current may be used without increasing the transverse current. Thus, for instance, the longitudinal current would be increased when the thickness of the piece to be welded was increased, but where the width was not. This would make a heavier path for the longitudinal current, but the section of the stock through which the transverse current flows would be no greater. The length of the path through the work for the transverse current might be slightly increased but would be almost nothing as compared with the increased section for the longitudinal current; or, if the increase of the thickness were attended by an increase of the width, then the transverse current would be increased in the proper ratio. Again, if the width of the stock was increased and the thickness correspondingly decreased in such ratio as to maintain the same area of cross section transversely through the bar or bars to be heated the longitudinal current would remain the same, while the transverse current would need to be larger, as the cross sectional area of the path would now be larger."

These remarks by Lemp clearly disclose that the path of the current is entirely governed by the size of the work and that Lemp has no idea whatever of governing the size of the path through the work by shaping his electrodes for that purpose, as is done by Harmatta. When Lemp's work is wide he provides wide rolls so that the rolls will extend entirely across the width of the work. This he must do in order to provide the currents which he says he does provide in the part of the specification which we have just quoted.

In order to illustrate the principles of his machine and show its advantages, Lemp illustrates in Figures No. 1 and No. 2 an impractical machine or one which possesses disadvantages. This machine illustrated in Figures No. 1 and No. 2 is practically one-half of Lemp's complete machine, or that part illustrated at A and A' in Lemp's Figure No. 4. Lemp tells us that in this crude machine of Figure No. 1 two independent currents are passed

through the work, one current through each of the strips, in the direction shown by the arrow X in Figure No. 1, that is, one current flows from D to D^1 and the other current flows from D^2 to D^3. According to Lemp, he is not sure in these old machines whether the pressure devices shown at D^1 and D^3 are used as terminals or not (page 1, line 96, to page 2, line 1). It is also well worth noting that in describing this defective machine Lemp tells us that two strips are indicated between the rolls at M, whereas the draftsman has not illustrated this work as strips but as wide plates. Figure No. 2 therefore does not agree with Lemp's description.

In all of Lemp's devices, even the devices of Figures Nos. 1 and 2, the work is pre-heated before it is passed through the pressure devices where the weld is actually made, and according to Lemp it is not necessary that these pressure devices are the terminals of an electric circuit, or, according to Lemp, the member which feeds the electricity is not thus at the same time the tool which provides the necessary welding pressure.

Lemp's idea was not to form an electric rivet or a weld perfectly answering the purpose of a rivet. Lemp showed no method of concentrating a welding current and a welding pressure at any spot in the lapped portions of two sheets. Lemp made both strips hot throughout their entire sections and therefore when they were acted on by the welding pressure there was a modification or change in shape of the work, accompanied by a certain amount of extrusion. The current for welding was not concentrated by Lemp's electrodes; neither was the pressure used for welding concentrated by the electrodes. The metal which Lemp pre-heated and softened for welding under his pressure devices was not entirely surrounded by relatively cold metal. Lemp's weld was not made quickly, as the operation required pre-heating at one station and transferring to another station to be upset and welded, involving considerable time. The welding operation deformed or altered the shape of the section of his strips and therefore modified them, especially in their cross-sections. This pressure exerted by Lemp on his heated strips forced one strip toward the other strip so that in the welding operation one part of his work was forced bodily toward the other part of the work. The size of Lemp's weld was not limited by the size of his electrodes; neither could the size of the weld be varied

under this limit by varying the amount of current. It would have been impossible according to Lemp's invention to make a number of separate welds in the plane surfaces of his work; the process is limited to one elongated weld. Lemp's weld and the heating for Lemp's weld was within full view of the operator. Lamp's weld is one of motion or a progressive weld in which the heated place is maintained between the terminals of his welding machine as the work progresses through the machine. Lemp's process is one of motion; Harmatta's process is one of rest.

Q. 18. Does the Perry patent No. 670,808 describe the subject-matter of the Harmatta patent in suit?

A. Perry's patent No. 670,808 does not in any way describe the subject-matter of Harmatta's patent.

Perry's method of electric welding is carried out by the apparatus shown in his figures. The apparatus consists of two push-blocks *f* and *g* which are made the terminals of an electric circuit. The work is placed between these push-blocks and when the circuit is closed the current passes from one push-block to the other through the work. These push-blocks are (page 1, line 75) "relatively of large volume or area compared to the contacting metal to be welded", so that Perry must select special shapes of work so that the work itself will concentrate the current and pressure. Perry tells us (page 1, line 83): "When the said parts to be welded are brought into contact their contacting faces are of relatively small area." The work suitable for Perry's process is crossing wires, as shown in his Figures Nos. 1, 4, 5 and 7, or contacting spheres which he shows in his Figures Nos. 6 and 7. When this form of work is placed between Perry's push-block electrodes and the current turned on the metal immediately is heated, softened and pushed together with an accompanying extrusion of metal. When the parts are relatively small this extrusion is in the gaseous form or in the form of volatilized metal (page 1, line 100), but where the work is of any material size it takes the form of the characteristic filet or burr (page 2, line 9). Perry's new result was what is now called cross-wire welding. Perry did not deal with work which could be rivetted together and his invention does not pertain in any way to a weld which will perfectly answer the purpose of a rivet. Perry does not concentrate a welding current

and pressure at any spot in the lapped portions of two members and his welding is always accompanied by a modification or extrusion of metal. Perry's welding current is not concentrated by his electrodes; Perry's welding pressure is not concentrated by means of electrodes. The metal heated by Perry for welding and thereby softened is not surrounded by relatively cold metal. Perry does not weld without any modification of the work, and Perry's parts which are welded together move toward each other in the operation. The size of Perry's weld is not governed by the contact area of his electrodes, and it would be impossible for Perry to make one weld at a time between the members he welds in case more than one weld was required to unite these bodies; for according to Perry the bodies are only allowed to touch at a point contact. Perry's welding is within full view of the operator, as clearly shown in his Figures Nos. 4 and 6.

Perry was not dealing with the same order of things as Harmatta and his method of welding has nothing to do with Harmatta's method of welding.

Q. 19. Does the Parkinson British patent No. 14,536 of 1894 describe the subject-matter of the Harmatta patent in suit?

A. Parkinson's patent No. 14,536 of 1894 does not in any way describe the subject-matter of Harmatta's patent.

Parkinson's invention pertains to the old art of glutting together the component parts of a metallic wheel. Glutting is similar in a way to puttying. A carpenter or a painter will fill up a depression or a defection by the plastic material putty; the wheel maker fills up a depression or a groove by using metal made plastic by heat. This the wheel maker calls glutting. Parkinson has invented a machine for doing this glutting by electricity; that is, the metal used for glutting is made plastic after it has been placed in position and while it is being pressed against the depression to be filled. Parkinson's wheel is made up by assembling a number of hairpin-shaped spoke members. These members form the spokes and the circumference of the wheel. Around the circumference, between each spoke member, is a triangular depression and it is this depression which is to be filled up with Parkinson's glut piece, which is forced into the depression while it has been made plastic by the heat developed in it. The glut piece and the spokes where

they contact with the glut piece are brought to a welding heat before the glut piece is subject to the final pressure. This, according to Parkinson, causes the glut piece to fill up the depression and weld itself to the spoke members.

Parkinson's machine, as shown in his Figure No. 3, is a large jig, so that it properly locates the component parts of the wheel when these component parts are assembled in the machine. The spoke members are clamped between the contact arms L; each pair of these contact arms operates as a clamp and constitutes one pole of Parkinson's electric circuit. The other pole of Parkinson's electric circuit is a push-block, shown at M. This push-block M is symmetrically located over the depression formed between the spokes and into which the glut piece is placed. The circuit is so arranged that it passes between the push-block M and the clamp L, L, through the glut piece and the portions of the spoke in contact with the glut piece.

The contact arms or clamps L (page 3, line 7) are made to fit against the spokes; that is, they are provided with a proper radius so as to snugly fit into the curvatures of the spokes and to retain this curvature while the wheel is subjected to the great pressure required in glutting or welding. When the wheel is increased in size this curvature naturally becomes greater so that a thimble or cap is placed on the contact arms L so that they may be made to snugly fit into the curves. These thimbles are shown at L^1 in Figure No. 3 and are described by the inventor in his specification (page 3, line 8). The contact arms L are made wide, as shown in Figure No. 2, so that they will extend across the entire width of the wheel to resist the pressure transmitted from the push-block M by the glut piece which (page 4, line 15) is "forged to the width of the wheel". In case the contact arms L did not extend across the full width of the wheel, it would be only a portion of the wheel which would be rigidly secured in position and when the great welding pressure was exerted the wheel members would be bent out of shape.

After the parts of the wheel are assembled in Parkinson's machine, water is admitted to the pipes P, *p*. This causes the contact arms L, L to clamp the spokes together and causes the contact or push-block M to bear against the glut piece. The current is

then turned on and it flows through the glut piece and the portions of the spokes in contact with the glut piece, causing this metal to become entirely heated and plastic. When the metal has been raised to this high temperature the valve on pipes T, t' is open and die pieces b, b' are pushed out over and under the glut piece, so that when the welding or glutting pressure is applied to compress the glut piece into place (page 2, line 33), it prevents it from unduly extruding although all the extrusion is not prevented. Parkinson's machine is of the multiple unit type and what we have described in connection with one glutting piece happens simultaneously at all the glutting pieces.

It should be noted that the contact arms L are wide and extend across the full face of the wheel (Figure No. 2) and that the push-block, or as Parkinson calls it the contact block, M, has a face larger than the top of the glut piece (Figure No. 3).

Parkinson is not dealing with an arrangement of work which is suitable or desirable to rivet, in fact, he is carrying out the art of glutting and not the art of rivetting and his new result is not a weld which will perfectly answer the purpose of a rivet, in fact, the work is not lapped in the same way as work is lapped for rivetting. In Parkinson's case there is no concentration of a welding current and a welding pressure at any spot in a lapped portion of the work. Parkinson's welding is not accompanied by a lack of modification, but is accompanied by extrusion, which is so great that he is obliged to provide die pieces in order to make his process in any way successful. The current for welding is not concentrated by the electrodes, the path for the current is determined by the top part of the glut piece and from an electrical standpoint the glut piece acts as a resistor for generating most of the heat used in the operation. The pressure for welding is not concentrated by electrodes. The metal softened for welding is not entirely surrounded by relatively cold metal, but is only partially surrounded by the die pieces which he provides. The weld is made rather slowly as it takes considerable time for his assembled joint to become uniformly heated; in fact, Parkinson must wait until his work becomes sufficiently heated (page 4, line 23). His welding consists in forcing the plastic glut piece into the depression formed between the spokes and therefore the work is subjected to a modification in the welding operation.

The glut piece is forced toward the spokes or compressed as Parkinson tells us (page 1, line 33) and therefore moves toward the spokes. The size of Parkinson's weld is not limited by the contact areas of his electrodes and it would be impossible according to Parkinson's machine to make several welds at different times, or even at the same time between the glut piece and the spokes, for it must be remembered that in glutting the whole glut piece is made plastic. The heating up to a welding temperature is done within full view of the operator, for it is not until after the glut piece becomes heated that the die pieces are brought into play.

Parkinson's machine deals with a process and a product totally different from the process and product of Harmatta's invention, with which it has practically nothing in common.

Q. 20. What result is obtained by the process of the Harmatta patent in suit?

A. The new result obtained by the process of Harmatta is a weld perfectly answering the purpose of a rivet.

Q. 21. Which, if any, of the patents in the prior art describes a process for obtaining that result?

A. I have no knowledge of any patent in the prior art which describes a process for obtaining that result.

Q. 22. Which, if any, of the patents in the prior art describes a process of electric welding in which the welding current and pressure are concentrated at any point in the meeting faces of two sheets of metal?

A. I know of no such patents.

Q. 23. Which, if any, of the patents of the prior art describes a process of electric welding in which the welding is performed without modification or mutilation of the work?

A. I know of no patent.

Q. 24. Which, if any, of the patents of the prior art describes a process of electric welding in which the current for welding is concentrated by an electrode?

A. I do not know of any patents with the current for electric welding concentrated by an electrode.

Q. 25. Which, if any, of the patents of the prior art describes a process of electric welding in which the pressure for welding is concentrated by the electrodes?

CHART SHOWING COMPARISON OF HARMATTA'S PATENT NO. 1046066 WITH THE PREVIOUS ART

District Court of the United States
Eastern District of Michigan
Southern Division
—
Kenna Shot Welder Co
vs
Ford Motor Co
—
Plaintiffs Exhibit No 13.
H. W. H.
Atty Pltf

		NEW RESULT (A WELD PERFECTLY CONFORMING TO THE PURPOSE OF A RIVET)	STEPS IN HARMATTA PROCESS				CHARACTERISTICS OF HARMATTA PROCESS											
			1	2	3	4	1	2	3	4	5	6	7	8	9	10	11	12
			OVERLAPPING THE SHEETS	CONCENTRATING WELDING CURRENT AND PRESSURE AT ANY SPOT	HEATING IN LINE OF CURRENT AND PRESSURE	WELDING WITHOUT MODIFICATION OR MUTILATION	HEATED BY OWN RESISTANCE	CURRENT FOR WELDING CONCENTRATED BY ELECTRODES	PRESSURE FOR WELDING CONCENTRATED BY ELECTRODES	SOFTENED METAL SURROUNDED BY COLD METAL	WELD MADE QUICKLY	NO MODIFICATION OF WORK INVOLVED IN WELDING	PARTS WELDED REMAIN STATIONARY	ELECTRODES REMAIN COLD DURING PROCESS	SIZE OF WELD LIMITED BY ELECTRODES AND CURRENT	ONE WELD CAN BE MADE AT A TIME	NO PREPARATORY MODIFICATION REQUIRED	WELD SURROUNDED AND CANNOT BE SEEN
NOT ELECTRIC WELDING	BENARDOS 363320		■										■				■	
	COFFIN 437571		■														■	
	BENARDOS (GER.) 30909		■														■	
	THOMSON 499019		■		■													
	BLANCHARD 466266				■		■							■			■	
	LEMP 531197				■		■							■				
	BURTON 647694		■		■		■							■				
	THOMSON 396015		■		■								■	■				
ELECTRIC WELDING	THOMSON 347140				■		■										■	
	THOMSON 347141				■		■										■	
	ROBINSON 574942		■		■		■										■	
	KLEINSCHMIDT 616456		■		■		■										■	
	THOMSON 444928		■		■		■							■			■	
	LEMP 533325		■		■		■							■			■	
	PERRY 670808		■		■		■				■			■			■	
	PARKINSON (BR. '34) 14536				■		■							■			■	
	HARMATTA APPLICATION		■		■		■						■	■	■	■	■	■
	HARMATTA 1046066		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

A. I know of no patent of the prior art.

Q. 26. Which, if any, of the patents of the prior art describes a process of electric welding in which the metal softened for welding is surrounded by cold metal?

A. None of the patents that I know of show a process of electric welding where the metal softened for welding is enclosed by cold metal.

Q. 27. Which, if any, of the patents of the prior art describes a process of electric welding in which there is no modification of the work involved in the welding operation?

A. I know of no patents.

Q. 28. Which, if any, of the patents of the prior art describes a process of electric welding in which the parts welded remain stationary with relation to one another under the welding operation?

A. I do not know of any patents.

Q. 29. Mr. Dyer, defendant's expert, in answer to X-Q. 112, has referred to the patents of the prior art "as if an authoritative book had been written on the subject" of spot welding. What have you to say briefly concerning the prior art as an authoritative book on that subject?

A. I have bunched together the patents to which Mr. Dyer refers and which was called by him an authoritative book on the subject, and I have condensed these patents into the form of a chart or index so that the subject-matter of all these patents can be quickly and conveniently observed, and I find that Mr. Dyer's so-called book has many pages missing. The chart or index to which I refer tabulates the patents of the previous art, classifying them as to whether they are not electric welding or are true electric welding patents. The patents are further sub-divided into those pertaining to arc welding, hot resistor welding, soldering, heating only, rivetting, butt welding, seam welding, cross-wire welding and glut welding. Harmatta's spot welding patent is also included, together with the disclosures of Harmatta's original application. The various properties of the Harmatta process are also indicated on the chart, consisting of Harmatta's new result, the steps in Harmatta's process and the characteristics of Harmatta's process. The shaded portions indicate the agreement between the Harmatta patent and the patents of the previous art, and the unshaded por-

tions or squares indicate a disagreement between the patents of the previous art and Harmatta. It is therefore very easy to compare Mr. Dyer's so-called book with the disclosures of Harmatta. If the book which Mr. Dyer considers authoritative was really so, there would be no columns in the chart entirely free from shading, like the column devoted to the second and fourth steps in Harmatta's process; the column devoted to Harmatta's new result; or columns indicating characteristics Nos. 2, 3, 4, 6, 9, 10 and 12. According to the chart, Mr. Dyer is not, according to my mind, a good judge of authoritative literature.

(Counsel for complainant offers in evidence the chart produced by the witness, and the same is marked "Plaintiff's Exhibit No. 13, Chart Showing Comparison of Harmatta's Patent No. 1,046,066 with the Previous Art".)

Q. 30. Which of the patents of the prior art were you familiar with before you knew of the Harmatta process?

A. Early in 1901 I made and had made a search of the Patent Office to secure all the patents pertaining to electric welding. The collection of patents which I secured at that time included all the patents mentioned in my testimony with the exception of Bernados' German patent No. 50,909 and Parkinson's British patent of 1894, No. 14,536, and with the possible exception of Robinson's patent No. 574,942.

Q. 31. Did the knowledge of these patents suggest to your mind the process of the Harmatta patent in suit?

A. These patents did not suggest to my mind in any way the subject-matter of Harmatta's patent in suit, which they no doubt would have done if Harmatta's ideas had been present. I was employed at that time, while these patents were in my possession, at the works of the American Tube & Stamping Company in Bridgeport, Connecticut. My duties were to develop new processes of welding and it would have been to my great financial benefit if I had been able at that time to propose Harmatta's method of welding so that an electric weld could be used to perfectly answer the purpose of a rivet. The American Tube & Stamping Company had many conditions to which the Harmatta weld could be applied and it would have been to their great benefit to have had such a process.

But in spite of all this the idea of Harmatta's spot weld never came into my mind.

Direct examination closed.

Cross Examination.

By Mr. Church.

X-*Q*. 32. I hold in my hand a publication entitled "Electric Welding" by Douglas T. Hamilton, A. S. M. E., and Erik Oberg, A. S. M. E., published in New York by the Industrial Press and in London by the Machinery Publishing Company, Limited, and bearing the imprint 1918. On page 2 of this publication I find the following:

"*Different Systems of Electric Welding.*

"The principle of electric welding is simple; the parts that are to be welded together are heated to a welding temperature by means of an electric current. There are two ways in which the electric current can be utilized for heating to a welding temperature, and, according to the methods used, two main processes or systems of electric welding may be distinguished - the electric resistance-welding process and the electric arc-welding process. In the former — the resistance-welding process — the parts to be welded are brought to a welding heat by the passage through them of an electric current of such voltage and amperage that the resistance to the flow of the current is great enough to produce sufficient heat at the points or surfaces to be welded, so that, when the parts are brought together by a slight pressure, they will be joined by the fusing of the metal, — that is, by welding. In the latter system — the arc-welding method — an electric arc is drawn between two electrodes or between the work and one electrode. This arc is brought into such a position relative to the work that the heat from the arc melts the metal to be welded, and enables the parts to be united. There are various modifications of this latter process, but, in principle, the above description is correct."

Do you agree or disagree with this description of the different kinds of electric welding?

A. Viewed from a purely popular sense the statements are such as to give to the lay mind a general idea of Thomson's electric welding process which he termed electric welding and the arc blow-pipe

effect which the author has termed arc-welding. According to my idea, we should retain Thomson's coined phrase "electric welding" to represent what the author terms resistance-welding. From a scientific point of view the author's description of the electric welding process which he terms resistance-welding is rather misleading because it is not entirely accurate. He tells us that in the electric welding or resistance process the pressure used is very slight, yet Kleinschmidt in his patent No. 616,436 in describing his process which had an extended commercial use tells us that the pressure used in his process is about 25,000 pounds (page 2, line 3, Kleinschmidt's patent No. 616,436). The Kleinschmidt process is a true electric welding one, or one using what the authors of your book call the resistance process. Twenty-five thousand pounds does not appeal to me as being a very slight pressure. I therefore cannot say that I entirely agree with the quotation which you have read.

×-*Q.* 33. In the same publication referred to I find on page 96, under the heading "Relation of Time to Current and Pressure in Spot Welding", the following: —

"There are four vital points that must be taken into consideration in making a satisfactory spot weld. They are: 1. Condition of stock, whether pickled, oxide-coated, coated with zinc, lead, etc. 2. Time required to make the weld. 3. Pressure on electrodes which should bear a direct relation to the current used and the time taken to make the weld. 4. Amount of current passing through the secondary circuit. An increase in the pressure necessitates an increase in the amperage of the current; and the lower the amperage, the greater the length of time required to complete the weld, and vice versa. As the thickness of the stock increases, the pressure and current should be increased."

What have you to say as to the correctness or incorrectness of this statement?

A. The statements are generally correct.

×-*Q.* 34. On pages 118, 119 of this publication I find the following (I quote from the last paragraph on page 118): —

"The generally accepted idea that spot welding is practical to only as high as one-eighth inch thickness of sheet is fully disproved in recent practice. By the use of simple methods, there is practi-

cally no limit to the thickness which can be spot welded. This is indicated in Fig. 20 where two bars each seven-eighths inch thick have been spot welded together. The operation took about one minute."

Have you any reason to doubt the correctness of this statement?

A. Viewed as an experimental feat, I have no reason to doubt this statement.

×-*Q.* 35. From the same publication I quote the following under the head "Spot Welding" (page 95) : —

"Tin can be welded to tin or to sheet iron but the stock will be discolored at the weld."

(Page 97 :) "In welding brass, galvanized iron, tin, terneplate, German silver, aluminium, sherardized steel, and all coated materials, it is advisable to use less pressure between the electrode points."

(Page 98 :) "In welding tin —, lead —, or zinc-coated iron, both the upper and the lower electrodes are pointed."

Have you any reason to doubt the accuracy of these statements as to the spot welding of metal-coated metals?

A. As long as I understand that you refer to steel covered with various coatings I have no doubt that the results described can be obtained.

×-*Q.* 36. Do you read German?

A. No, I do not.

×-*Q.* 37. Upon what translation of the Bernados German patent did you rely in giving your testimony concerning the disclosure of that patent?

A. In discussing Bernados' patent I rely on the translation of Bernados' German patent by Mr. Brandt.

×-*Q.* 38. How does an ordinary blacksmith determine when two pieces of metal to be united by welding have reached the proper welding temperature?

A. By judging from the color of the heat.

×-*Q.* 39. In other words it is by visual inspection or observation?

A. Yes.

×-*Q.* 40. In like manner, does not the operator of a spot welding machine observe the color of the heat spot and govern the duration of pressure and current accordingly?

A. No; because the spot heated for welding is covered up by the tips of the tools, so he cannot actually see the spot which he is heating for welding.

×-*Q.* 41. He does, however, observe the color of the heat spot on the exterior of the parts being welded and govern himself accordingly?

A. I cannot agree with you.

×-*Q.* 42. Are you a practical spot welder?

A. Yes.

×-*Q.* 43. If you were welding together by a spot welding machine one-eighth inch plates, how would you know when you had accomplished or obtained a spot weld?

A. By testing the work after it was processed.

×-*Q.* 44. As a matter of fact, in the operation of a spot welding machine, is there not an observable spot visible around the electrode or electrodes that grows brighter and brighter as the application of pressure and current is continued?

A. This only happens in case the current is continued for a much longer time than is required to make the weld and would be disastrous to the work.

×-*Q.* 45. What would be disastrous to the work?

A. Allowing the heat to soak away off around the desirable spot for welding. Such excessive heat was not contemplated by Harmatta and would not produce an unscarred sample of work. In case of very thin work it would cause the work to buckle. Besides, if a welder had to rely on allowing his heat to spread out before he interrupted the current, it would make the process very slow.

×-*Q.* 46. Are you prepared to affirm that a practical spot welder pays no attention at all to the appearance of the heat spot surrounding the electrode during the application of the requisite heat and pressure to effect a weld?

A. I am prepared to affirm that a practical spot welder (and I understand you to mean by practical welder one engaged in commercial work) pays no attention whatever to heat markings of the work so as to govern his application of current and pressure.

×-*Q.* 47. In the spot welding of articles like the mufflers offered in evidence to establish the alleged infringement of the defendant

in this case, what would happen if the current and pressure were maintained too long?

A. That would depend entirely on the amount of current the machine was set to give. If the machine was adjusted for a very moderate current, just sufficient to make a weld, the oxidization marks around the tool would be materially increased. If, however, the machine was set to give a very large current, the metal directly under the tools would become melted and a hole would be made instead of a weld.

X-*Q.* 48. By oxidization marks around the tool do you refer to the visible heated area that is more or less bright to the eye?

A. No; I mean the oxidization which is produced by the metal under the tool distributing its heat to the surrounding area, or running back on the work, the same way that the heat runs back on the work when a blacksmith tempers a tool. If the current is only on for a short time and the work immediately removed from the machine, it is no doubt that these heat markings can be seen spreading out as the heated spot cools off. These heat marks can be produced at a temperature below a red heat and therefore the heat markings would appear at places which had not been visibly hot.

X-*Q.* 49. You would not have the court believe, would you, that in the operation of an ordinary spot welding machine there is not observable a heat spot more or less intensely red around the electrode or tool?

A. I can only speak from my own observation and my own practice, according to which there is no heat spot around the tool which would guide anyone in the regulation of the current and pressure.

X-*Q.* 50. Question repeated.

A. In case a very weak current is used and we have to wait for an appreciable time for the metal to become heated the metal may become visibly red hot around the tool.

X-*Q.* 51. And the same would be true if a very heavy current were used for uniting relatively thick plates, except that in the latter case the visible ring or spot would be more pronounced. Do I state the matter correctly?

A. I have never seen the welding of very heavy plates carried out commercially, but as it is very difficult to secure enough current

for such work I imagine that the work would be heated rather slowly and that a red heat would be observable around the tool.

×-*Q.* 52. If it were so observable, it would still be the so-called Harmatta process, wouldn't it?

A. I believe it would be so called.

×-*Q.* 53. Referring now to the Burton patent No. 647,694, is not the apparatus therein shown and described intended to bring the parts of the article to be united to a welding temperature by an electric current of large volume and low voltage?

A. Yes.

×-*Q.* 54. Are not the parts of the work to be united pressed between electrodes carrying the electric current?

A. They are placed between electrodes carrying the current. The inventor says the electrodes are brought in contact with the work, but he does not give the idea that the electrodes exert sufficient pressure to warrant me admitting that the work is pressed between the electrodes.

×-*Q.* 55. Without pressure no welding current would pass, would it?

A. Theoretically, there must be contact, but not necessarily pressure. If we consider that which holds the electrodes in contact with the work pressure, then pressure is exerted by the electrodes, but if we consider pressure that which is powerful enough and that which is used to upset the work, then no pressure exists.

×-*Q.* 56. Does not this patentee Burton specifically provide pressure apparatus quite comparable to the pressure apparatus of an ordinary spot welding machine?

A. It is not comparable to the pressure devices of the spot welding machines which I have seen. It will be noted that there is less pressure applied to the work than is applied at the pedal, owing to the mechanical arrangement of the parts. The spot welding machines I have seen exert more pressure to the work than is applied to the operating lever.

×-*Q.* 57. Mr. Dyer, defendant's expert, has told us that the pressure required and actually used in an ordinary spot welding machine for the spot welding of thin plates was not greater than that which the hand can bear when interposed between electrodes. Do you controvert that statement?

A. It is quite true that in welding thin metals with a very small weld that the hand can withstand the pressure of the tool. This is no doubt due to the fact that the tool is bluntly pointed so that the pressure is distributed over a larger area over the hand than it is on the work. If the contact area of the tool was carried back straight instead of tapered, it would be much more difficult for the flesh of the hand to resist the pressure. It must also be remembered when making a small weld that the area of the contacting tool is very small, and therefore the total pressure required may not appear very great, but if we consider this pressure as so many pounds per square inch, then the pressure exerted on the work would seem quite large.

×-*Q.* 58. While we are on this subject of pressure, will you tell us what instrumentality is shown in the Harmatta patent for applying pressure to the electrode?

A. A simple hand lever, shown at *e* in Harmatta's Figure No. 2, acting in connection with the fulcrum *f* is used for transmitting the pressure from the operator to the work. The distance between the fulcrum and the work is very much smaller than between the point where the lever is grasped by the hand and the fulcrum, so that the pressure acting on the work is multiplied over the pressure which is exerted at the handle of the lever. It should be noted that this hand lever is long, too long to be placed in its entirety in the drawing and therefore it is shown broken, with a part removed.

×-*Q.* 59. What is said in the Harmatta patent about the extent of the pressure to be applied?

A. The amount of pressure can be readily determined by experiment. That is, the amount of pressure applied by the hand to the lever shown in Figure No. 2 may be varied by the hand according to "the different sizes or thicknesses of the metal".

×-*Q.* 60. Are you prepared to say that with an apparatus such as shown in the Burton patent a sufficient pressure could not be obtained between the upper and lower electrodes for the purposes of making a spot weld, provided the electrodes were of suitable form?

A. If we selected very thin sheets and a very small tool, I have no doubt sufficient pressure could be exerted to that required in spot welding.

×-*Q.* 61. And if you desired to unite thicker sheets, do you think it would be much of an engineering job to contrive to apply more pressure if more pressure were needed?

A. I consider it quite an engineering job to exert sufficient pressure with Burton's apparatus: in fact, I would consider it an impossible job. In the first place, it would be impossible to exert even the weight of a man on the lever or foot pedal shown in Burton's figure, for the conductor 120 and the work itself would prevent a man from standing on the lever.

×-*Q.* 62. Does not the Burton patent say that the current may pass in either direction from the generator with the same result?

A. Yes.

×-*Q.* 63. What do you understand him to mean by that?

A. I understand him to mean by that that the conductor 150 and the conductor 120 can be made of either polarity without influencing the results of his machine.

×-*Q.* 64. Considering that the apparent object of the Burton appliance is to raise the temperature of the parts to be united to a welding temperature, what would be your idea of the proper materials to be employed for the electrodes to effect this purpose?

A. Considering the construction shown by Burton, I had a tendency when you first asked the question to say that his contact electrodes would be of copper, which he tells us is the case with the lower electrode or the block attached to the anvil (page 1, line 103); but viewing the arrangement of his machine in the light of practice I cannot see how even copper could be used without it getting hot and soft, for it is well shown in Burton's constructions that these blocks of copper are intended to contact over large areas with the heated metal, and I cannot possibly see how the heat conducted into the copper can be dissipated.

If I was going to construct Burton's machine I would suppose that his electrodes were made of copper, but I am afraid my machine would not be at all satisfactory.

×-*Q.* 65. Assuming, for instance, that the upper electrode of the turret has a spherical end, such as that numbered 240, and that it co-operates with a plane bed electrode or with a corresponding spherical electrode, can you imagine a smaller contacting surface applied to the work than that afforded by the perimeter of a sphere?

A. If your sphere is of perfectly rigid material and the work is of perfectly rigid material and the electrode coacting with the ball is of perfectly rigid material and the work does not get hot and soft, I cannot imagine a smaller contact, because the contact is a point.

×-*Q.* 66. Take Figure 6 of the Burton patent, for instance; do you not understand that the proximate diagonal faces of the parts there shown are the faces to be welded together?

A. Yes.

×-*Q.* 67. How do you understand the electric current is to be applied so as to bring those proximate diagonal faces to a welding temperature?

A. In the same manner as the inventor shows in his Figure No. 2. The parts are assembled between the electrode 210 and the electrode 100, still retaining their position as shown in Figure No. 6, the current passing from one electrode to the other across the overlapping ends, but not necessarily across the joint.

×-*Q.* 68. Is it your idea that the overlapping ends of the work are held or clamped between the electrodes 210 and 100?

A. I can't say that my idea is that they are clamped between these two electrodes, because to my mind clamping implies exerting considerable pressure. My idea is they are placed between the two electrodes so that both electrodes make contact with both pieces.

×-*Q.* 69. If they are placed between the two electrodes and the foot lever is brought down, would it not follow that the diagonal faces of the parts to be united would be brought into contact?

A. No, this would not be the case. If they were separated before they are placed under the electrodes they would stay separated when the foot lever was depressed.

×-*Q.* 70. What would prevent them from coming in contact under the pressure of the electrode?

A. The unchamfered portions of the work in close proximity to the chamfered portions of the work.

×-*Q.* 71. If the object of the whole scheme is to raise to a welding temperature the inclined proximate faces of the work, isn't it entirely reasonable to suppose that the electric current is intended to be applied directly to those parts instead of to some part of the work remote from those parts?

A. I do not know that the object of the invention is to raise

simply the faces of the work to be welded to a welding temperature, and when I consider the other constructions shown by the inventor I believe his object was to generally heat the work in the same way that it is generally heated in a blacksmith's forge.

×-*Q.* 72. Question repeated.

A. I cannot agree with you in supposing the whole scheme to be to raise to a welding temperature simply the inclined proximate faces of the work.

×-*Q.* 73. Turning now to Figure No. 13 of the Burton patent, the ends, both ends, of the rivet shown through the overlapped plates are apparently upset. What according to your reading of the patent has caused this upsetting?

A. According to Figure No. 13 of my Burton patent the rivet is not shown upset.

×-*Q.* 74. According to your interpretation of the Burton patent, what is the apparatus shown in Figure No. 13 intended to accomplish?

A. I can only form my ideas from what the inventor says, and he distinctly states that "Figure No. 13 represents a vertical longitudinal section of one end of the anvil and of wheel and anvil electrodes adapted for rivetting" (page 1, line 60). This is the only description of Figure No. 13 which I know of in the patent. According to my interpretation of the patent I should consider that the inventor was trying to show the type of electrodes he used when he intended to set a rivet but had made a very poor job of it.

(Adjourned to Friday, November 15, at 9.30 A. M.)

BOSTON, MASS., November 15, 1918, 9.30 A. M.

Met pursuant to adjournment.

Present, counsel as before.

×-*Q.* 75. As an engineer supposedly skilled in the art of electric welding, I would ask you to tell us how you would proceed to apply a rivet according to the disclosure of the Burton patent, Figure No. 13.

A. Burton's disclosures are so vague relative to a rivet that I would not know how to proceed according to Burton's disclosures.

×-*Q.* 76. Well, suppose you were to use your own wits, how do

you think a rivet might be applied by the appliances shown in Figure No. 13?

A. Figure No. 13 does not in any way show how to apply a rivet. If anything, it shows a rivet which has already been applied.

×-*Q.* 77. Do you not gather from the Burton patent that Figure No. 13, taken in connection with the specification of the patent, is designed to show or illustrate a method of utilizing a welding electric current in the application of a rivet to two overlapped plates of metal?

A. I cannot admit that Burton uses an electric welding current in the true sense of the term, neither is there anything in the specification which would especially lead me to know whether or not Burton uses any current at all in connection with what he says illustrates a riveting idea.

×-*Q.* 78. Question repeated.

A. The specification is so vague that I really gather nothing from the specification, and if I had not a knowledge of the art derived from other sources than Burton's patent I would not be able to gather anything of any account from Burton's illustration No. 13 and his only description of it (page 1, line 60).

×-*Q.* 79. I am of course asking you to consider not only what Burton says in his specification but to take into account also that vast knowledge of the art of electric welding that you are supposed as an expert to have. With this understanding, will you please tell us how a rivet could be applied in accordance with the disclosure of Figure No. 13 of the Burton patent?

A. My vast knowledge of the art of electric welding must be augmented by a vast knowledge of electric rivetting, and supposing that I have a vast knowledge of both subjects I will answer your question. In order to electric rivet I would proceed as Thomson describes in his patent No. 396,015. I would provide a hole in each part to be rivetted; I would lap the work so that the holes registered; I would pass a rivet blank through the holes and I would apply electrodes which contacted with the rivet blank only. I would then turn on the current and allow it to act until the rivet blank became sufficiently heated. I would then force the electrodes together and turn off the current. That is the way I would pro-

ceed to electric rivet, but I cannot see any disclosures of this nature in Burton's patent.

×-*Q.* 80. Will you now please, by the exercise of your profound knowledge as an engineer, mechanic and expert, tell us how you could possibly devise a way of locating the foot piece of the foot treadle shown in Figure No. 1 of the Burton patent so as to enable the operator to apply his full weight to it?

A. If the parts were changed around so that the foot lever was not located directly under the conductor 120 and if smaller work was placed in the heating apparatus so that it would not be in the operator's way, a man then could stand on the foot lever. (Very little of my vast knowledge is used in giving this answer.)

×-*Q.* 81. Do you understand that the foot lever 180 is located immediately beneath the conductor 120?

A. The foot lever is, but the pedal on which the foot rests extends slightly forward.

×-*Q.* 82. In other words, the foot piece is out of the plane of the conductor 120 and the body of the foot lever. Am I right about this?

A. Yes.

×-*Q.* 83. Don't you think it is unfair and trivial to suggest, therefore, that the foot lever or treadle of the Burton patent is not intended to be entirely available so that if necessary the full weight of the operator may be applied to it?

A. No, I do not think that such an answer is unfair and trivial, because such answers indicate my opinion of the whole patent, that it is a very impractical and crude disclosure, and it is only by bringing out such points as the position of the foot lever that calls our attention to the crudeness of the invention. The foot lever in the patent does have the pedal extending slightly forward but the width of this pedal is such as would not accommodate the whole foot of a man. If a man should operate it, while facing the apparatus, with his right foot, he could not balance his body on the lever. He would therefore have to straddle the conductor 120 and operate the machine with his left foot, and although I must admit that if the work is not too large he could by straddling the conductor get the whole weight of his body on the foot lever, yet I do not believe the inventor intended the machine to be used in this manner.

×-*Q*. 84. If any such difficulty as you suggest should arise in the attempt to operate the Burton machine, do you think it would be insuperable and beyond your engineering skill to remedy?

A. Your question presupposes that the Burton machine is operative, and personally I do not believe the machine is operative, and there is a question in my mind if I could make a machine along the lines that Burton shows to satisfactorily operate. I have never seen such a machine in operation and I have never seen work in actual practice carried out as Burton proposes. Coming back to the foot lever in question, if that was the only part which prohibited the commercial working of the machine, I think my engineering skill would be sufficient to provide a remedy.

×-*Q*. 85. What great thing would you do to solve this difficult problem?

A. If this difficult problem to which you refer was to place the foot lever in an operative position, I would probably turn the anvil through 90 degrees, arranging the conductor 120 accordingly.

×-*Q*. 86. In other words, you would adjust the whole machine around the foot lever, thereby making the tail wag the dog. Is that what you mean?

A. What I mean is I would relatively change the position of the parts so that they would not interfere.

×-*Q*. 87. Coming back to Figure No. 6 of the patent, what do you regard as the overlapping ends of that figure? Where do the overlapping ends begin and end?

A. Truly speaking, the ends in their entirety do not overlap. It is only a portion of the ends of the members which overlap, parts of the ends having been removed by scarfing. Truly speaking, the metal has been prepared for scarf welding and not for lap welding. It is the scarfed portions of the two ends which may be said to be overlapped.

×-*Q*. 88. Do you mean to say, then, that the wedge-shaped extremities of the ends are overlapped? Is that a fair statement?

A. Yes.

×-*Q*. 89. When the patent of Burton says "The current passes through the work in transverse direction across the overlapping ends of the parts", it doesn't mean that the current does not pass

through the work in transverse direction across the overlapping ends of the parts, does it?

A. The current may pass, according to the inventor, "through the work in transverse direction across the overlapping ends of the parts to be heated" without necessarily passing across the joint. Figure No. 11 distinctly shows this. In this figure it would be impossible for any current to pass across the joint, yet as the electrodes are made very broad it is plainly evident to anybody that the current will pass across the overlapping ends but will not pass across the joint, because the joint is open. Even if the joint was closed, only a very small portion of the current would pass across the joint.

×-*Q.* 90. When the Burton patent says (page 2, line 78) that "the piece is heated to the proper temperature", it means proper welding temperature, does it not?

A. Not necessarily, because the inventor (page 1, line 9) tells us that the invention may be used for forging or brazing or for setting. After telling us, according to your quotation, that the work is brought to a proper temperature he says that the work is in the proper condition so that it may be moved forward on the anvil, so that the joint may be hammered or otherwise finished. The proper temperature then is the proper temperature for the operation which is to follow, that is, welding, forging or brazing, and I might add, due to Figure No. 13, rivetting.

×-*Q.* 91. Now, will you not be fair enough to counsel and to the court to admit that the statement quoted in my last question as to proper temperature is found in the description of the use of the apparatus in the lap welding of pieces, said description beginning page 2, line 67?

A. I have already admitted that when the subsequent operation is to be welding that the parts are raised to this welding temperature, and if we confine our attention solely to line 67, it is my opinion that the parts are brought to a welding temperature before they are removed from Burton's heating apparatus.

×-*Q.* 92. Do you regard it as a fair definition of electric welding to say that it is a process in which the work is brought to the welding temperature by internal heat generated by the resistance of the

work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure?

A. I do not, as your definition implies it is only the contact resistance which is to be considered.

×-*Q.* 93. You do not think then that that is a good definition of electric welding?

A. Not strictly speaking.

×-*Q.* 94. I now draw your attention to the fact that I have embodied in my question word for word the definition of electric welding given in the Harmatta patent on page 1, second column. Does this change your ideas about the matter?

A. No, it does not.

×-*Q.* 95. Is the process of electric welding as defined in X-Q. 92 carried out in the practice of the method disclosed in the Robinson patent?

A. Robinson is very vague in his descriptions of the process he employs. It is my opinion, however, that heat would be developed not only at the contact between the ends of his projections and the web of the rail, but also in the shank of the projection.

×-*Q.* 96. Question repeated. Will you please answer yes or no?

A. It is not definitely disclosed by Robinson what his idea of electric welding is, but if it answers to the true definition of the term electric welding, heat is developed not only at the actual contact between the bodies but also in the body of the projection itself, and therefore according to Robinson the heat at the joint itself is reinforced by the heat developed in the projection and the resistance of both must be considered in our definition.

×-*Q.* 97. Question repeated.

A. In one sense yes, and in another sense no. There is heat developed at the joint by the initial resistance of the joint which immediately heats when the current is applied, but this initial resistance of the joint quickly lessens and the resistance of the shank of the projection quickly increases due to its increased resistance by the passage of the current through it, causing it to heat and add resistance and this added resistance causes it to heat more, so that at the initial stages of Robinson's weld the resistance of the joint may be the big factor, but at the following stages the resistance of the metal through which the current is flowing

adjacent to the weld is the big factor. Both of these conditions must be taken into account in the general definition of electric welding.

×-*Q*. 98. Is electric welding as defined in my X-Q. 92 and as defined in the Harmatta patent practiced in carrying out the method of the Kleinschmidt patent? Please answer yes or no.

A. It is my opinion that Harmatta means by saying "at the place of contact between the parts to be joined" the general location at the parts to be joined and not just the contact faces only between the two bodies being joined. It is my opinion that Kleinschmidt was dealing with a true electric welding process just the same as Harmatta was dealing with a true electric welding process. It is also my opinion that your definition only takes into account the initial heating stages which occur in the electric welding process, or, in other words, limits the heating effect entirely to a contact resistance between the work and leaves out the idea of the resistance of the work itself.

×-*Q*. 99. Question repeated.

A. I cannot answer your question yes or no because I do not believe your definition gives the same idea as is implied by the Harmatta patent.

×-*Q*. 100. Is electric welding, as defined in my X-Q. 92, and in the Harmatta patent itself in the same words, practiced in the carrying out of the process disclosed in the Rietzel patent No. 928,701?

A. The purely contact resistance between the parts to be welded seems to have been used more by Rietzel than by previous inventors, and if I understand your definition of electric welding to simply embody the idea that it is only the contact resistance between the surfaces which furnishes the heat, Rietzel approaches more your definition of electric welding, for it will be noted that in Rietzel he makes his projections pointed and speaks of them throughout the specification as points, and this shape of projections naturally makes the resistance right at the joint greater than elsewhere. Even in Rietzel's case it is really the resistance of the work itself immediately at the point of contact, together with the resistance of the joint between the parts, which causes the heat he uses in his operation.

×-*Q.* 101. You cannot, then, answer my question categorically yes or no?

A. As both the contact resistance at the start of the weld and the resistance of the work itself immediately in contact with these portions comes into play, I cannot answer your question either yes or no.

×-*Q.* 102. Is the definition of electric welding contained in my cross-question 92, and in the same words in the Harmatta patent itself, applicable to the process of electric welding set forth in the Harmatta patent?

A. On re-reading your question X-Q. 92 you say "the resistance of the work itself", which I shall hereafter regard as meaning the resistance of the work itself, and not my former interpretation of your words which were tempered to my mind by your following passage, "at the place of contact between the parts". Your definition to my mind implied a paradoxical idea because there is such a thing as a contact resistance and you speak of this place of contact as being between the parts to be welded, and I cannot imagine any portions of the work themselves as being "between the parts to be joined". I therefore shall in the future treat your question as though you mean the first part of your question, which relates to the "internal heat generated by the resistance of the work itself". I now answer your question by saying yes.

×-*Q.* 103. Now, in view of the great light that has broken in upon you, would you not also say that electric welding as defined in my X-Q. 92, and in the same words in the Harmatta patent, applies to Rietzel?

A. Yes.

×-*Q.* 104. And applies to Kleinschmidt?

A. Yes.

×-*Q.* 105. And applies to Robinson?

A. Yes.

×-*Q.* 106. Does not each of the welds produced according to the process disclosed in the Rietzel patent answer the purpose of a rivet and is it not so stated in the patent?

A. No, not in every case. It will be noted that although in some cases Rietzel's welds may be used as rivets, as stated by the inventor, yet in other cases they will not perfectly answer the pur-

pose of a rivet. For instance, if it is desired to place in the head of a steel barrel by Rietzel's process and this head is made to fit perfectly for rivetting, the placing of the projections on the work would prohibit the head of the barrel being put in place. The barrel could be made by rivetting but it could not be made satisfactorily in a commercial way by the Rietzel process owing to the fact that the projections would interfere with the placing of the parts. In cases where the movement of the parts toward each other in the operation are not objectionable the Rietzel process may in some cases be used instead of rivetting.

×-*Q.* 107. Give an instance.

A. The making of steel pulleys, for instance, are made very satisfactorily by the Rietzel process.

×-*Q.* 108. And in that case the welds perfectly answer the purposes of rivets, do they not?

A. Although I have never been intimately associated with the industry of making steel pulleys, I should think that the Rietzel welds would answer the purpose of a rivet.

×-*Q.* 109. Does not the Rietzel patent disclose metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the back of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas? This is the language of claim 16 of the Rietzel patent as originally granted.

A. Yes.

×-*Q.* 110. Does not the Rietzel patent show sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots? This is the 17th claim of the Rietzel patent.

A. No, the Rietzel patent does not show these parts welded; it shows them before they are welded. After the welding operation I have no doubt that the work would be as described.

×-*Q.* 111. Does not the Rietzel patent disclose composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said

spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered? This is the 18th claim of the Rietzel patent.

A. Yes.

×-*Q.* 112. Does not the Rietzel patent also disclose metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot? This is the 19th claim of the Rietzel patent.

A. Yes.

×-*Q.* 113. Does not the Rietzel patent disclose a metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points? This is the 20th claim of the Rietzel patent.

A. Yes.

×-*Q.* 114. Does not the Rietzel patent also disclose the method of uniting two pieces of metal consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area, as compared with the area of the immediately opposed surfaces, so as to limit the union of the pieces to a spot or spots? This is the 3d claim of the Rietzel patent?

A. Yes, it discloses the method of doing this according to Rietzel.

×-*Q.* 115. Does the patent of Rietzel disclose butt welding or spot welding, or both?

A. The Rietzel patent really discloses the method of butt welding, rather than what to my mind is truly spot welding.

×-*Q.* 116. Does it disclose spot welding at all?

A. It discloses a method of uniting sheets at spots, and whether it discloses spot welding or not depends entirely upon the definition of spot welding.

×-*Q.* 117. In the course of the two depositions that you have

given, you have several times undertaken to define what you consider to be spot welding. I therefore now ask you whether the Rietzel patent discloses what you have thus defined as spot welding?

A. According to my definition of spot welding, the Rietzel patent does not disclose spot welding.

Cross-examination closed.

Redirect Examination.

By Mr. STACKPOLE.

RDQ. 118. In the book on Electric Welding by Messrs. Hamilton and Oberg, to which your attention was called in the cross-examination, I find on page 107 in the chapter devoted to spot welding the following statement: —

"Strength of spot welded joint. — One of the chief advantages of electric spot welding is that it takes the place of riveting on many classes of work, and not only does the work more rapidly, but also more effectively. For instance, an electric spot-welded joint is stronger than a riveted joint."

Do you agree with this statement?

A. Yes.

(Counsel for defendant requests counsel for plaintiff to state upon what claims of the Harmatta patent the plaintiff proposes to press for a decree.)

(By Mr. STACKPOLE. As at present advised and subject to future limitation, counsel for plaintiff states that plaintiff will rely on all of the claims of the Harmatta patent.)

(Adjourned subject to further notice.)

JAMES H. GRAVELL.

I, Hector M. Holmes, a Notary Public within and for the Commonwealth of Massachusetts, do hereby certify that the foregoing deposition or James H. Gravell was taken on behalf of the plaintiff in the suit of *Thomson Spot Welder Company* v. *Ford Motor Company*, in pursuance to agreement of counsel, before me as Special Examiner, at Boston, in the County of Suffolk and Commonwealth of Massachusetts; that the said deposition was taken on the eleventh, twelfth, thirteenth, fourteenth and fifteenth days of November, 1918; that said witness was by me sworn to tell the truth, the

whole truth and nothing but the truth; that his testimony was written out in his presence on a typewriter by a skilled operator; that the opposing party was represented by counsel during the taking of said testimony, as appears by the record of said testimony; that by agreement of counsel the testimony was taken in my absence, and that I am not connected by blood or marriage with either of said parties, nor interested directly or indirectly in the matter in controversy.

In witness whereof I have hereunto set my hand and notarial seal at Boston, in the Commonwealth of Massachusetts, this fifteenth day of November, 1918.

HECTOR M. HOLMES,
[SEAL] *Notary Public and Special Examiner.*

BOSTON, November 14, 1918, at 12 M.

Met pursuant to agreement of counsel.

Present: J. L. STACKPOLE, Esq., of Counsel for Plaintiff;
MELVILLE CHURCH, Esq., of Counsel for Defendant.

WALTER BRANDT, having been first duly sworn, doth depose and say as follows: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. What is your name, age, residence and occupation?

A. Walter Brandt; age, thirty-six years; residence, 36 Wren Street, West Roxbury, Mass.; occupation, assistant in the patent department of the United Shoe Machinery Corporation.

Q. 2. Are you familiar with the German language?

A. Yes.

Q. 3. Have you had experience in the translating of German patents into English and of translating English specifications into German?

A. Yes; during more than the past twelve years.

Q. 4. What has been your general experience in qualifying you to do this work?

A. I was born in Munich, Bavaria, and received my education in Munich and in the University of Heidelberg. After graduating there I became connected with the United Shoe Machinery Com-

pany in 1906 as assistant in their patent department and have been continuously employed there since that date. During the past twelve years I have prepared and prosecuted patent applications in Germany, Austria and all countries in which the German language is used officially in patent matters.

Q. 5. I asked you the other day to make a translation of the German patent No. 50,909 to Nikolas von Bernados. Have you done so?

A. Yes.

Q. 6. Please produce a copy of that translation.

A. I here produce it.

Q. 7. Was this translation made by you?

A. Yes.

Q. 8. From the German text?

A. Yes.

(Counsel for plaintiff offers in evidence the translation of the Bernados patent produced by the witness, and the same is marked "Plaintiff's Exhibit No. 12, Plaintiff's Translation of German Patent to Bernados No. 50,909, H. M. H., N. P., Nov. 14, 1918".)

Q. 9. When I asked you to translate the Bernados German patent I also gave you a translation of that patent which I had received from Mr. Church, defendant's counsel, and which I hold in my hand. Please state whether or not you found in that copy furnished by Mr. Church any mistranslations which would change the meaning of the text; and, if so, point out what they were.

A. In line 6, page 1, of the translation furnished by Mr. Church, the words "mixture of carbons and clay" are incorrectly translated. The German patent states "mixtures of clay *with* carbon". The use of the word "and" is apt to misconstrue the meaning of the whole sentence. Throughout the translation the term "welding tool" is used. There is no corresponding term in the German patent; the word "welding tool" has been used without authority. The German term "Lothkolben" should be translated as "soldering iron".

Page 2, line 13 from the bottom, "heavy" should be "moderate". There are numerous parts incorrectly translated, but it does not

appear that the wrong translation alters the meaning of the text to an appreciable extent.

Direct examination closed.

No cross-examination.

Deposition closed.

Signature and certificate waived.

New York, April 7, 1919.

District Court of the United States, Eastern District of Michigan, Southern Division. In Equity.

Thomson Spot Welder Company, Plaintiff,

vs.

Ford Motor Company, Defendant.

Harmatta Patent No. 1,046,066.

Depositions taken on behalf of the plaintiff at the office of Messrs. Townsend & Decker, 149 Broadway, New York City, on the seventh day of April, 1919, before George E. Brown, notary public in and for the State of New York.

Met pursuant to agreement of counsel.

Present: J. L. Stackpole, Esq., of Counsel for Plaintiff;
Melville Church, Esq., of Counsel for Defendant.

Deposition of Henry C. Townsend.

Henry C. Townsend, having already been sworn in this case, deposes and says in answer to interrogatories propounded to him by Mr. Stackpole as follows: —

Q. 1. Are you the Henry C. Townsend who has already given a deposition in this case on behalf of the defendant?

A. Yes.

Q. 2. In that deposition you have testified that you were counsel for the Thomson Electric Welding Company during the interference of *Rietzel* v. *Harmatta* in the United States Patent Office in which the Rietzel patent was owned by the Thomson Electric Welding Company.

It appears from the record of that interference that Rietzel filed a preliminary statement to which attention was called in your former deposition, and that Harmatta was awarded priority by judgment on the record, because no testimony was taken on behalf of Rietzel.

Please state, if you know, the reasons why no testimony was taken on behalf of Rietzel in the said Harmatta-Rietzel interference.

A. After carefully considering all the facts I concluded that Rietzel could not succeed in that interference and that the final award of priority would be to Harmatta, and a patent would issue to him even if the case were taken up to the Court of Appeals of the District of Columbia, as it should have been if it were desired to get a final judgment.

Q. 3. What were your reasons for believing that Rietzel could not succeed?

A. I thought that what he did so many years previous to Harmatta's filing date would be regarded rather in the light of an abandoned experiment and that Harmatta, having filed an application before Rietzel, would be given the award.

Q. 4. Did you discuss with Mr. Rietzel what he did years before the filing of Harmatta's application?

A. I must have had some talk with him about the facts which he could testify to. Some of them, however, may have come to me through Mr. Tischner.

Direct examination closed.

No cross-examination.

Deposition closed.

HENRY C. TOWNSEND.

Attest: GEORGE C. BROWN,

Notary Public and Special Examiner.

Deposition of Charles F. Tischner.

CHARLES F. TISCHNER, being duly sworn, deposes and says in answer to interrogatories propounded to him by Mr. Stackpole as follows: —

Q. 1. Are you the Charles F. Tischner who has already given a deposition in behalf of the defendant in this case?

A. I am.

Q. 2. Did you at any time during the pendency of the Rietzel-Harmatta interference go to Europe for the purpose of investigating the ownership of the Harmatta application?

A. I did.

Q. 3. When did you go?

A. I sailed from New York for Bremen, Germany, in the early part of December, 1911.

Q. 4. State what you did, so far as the Harmatta application was concerned, on that trip.

A. When I arrived in Berlin from Bremen I got in communication with Mr. Johann Harmatta, the applicant with whom Rietzel was in interference, and he came to Berlin, and in taking up the matter of his invention with him I learned that a company called the Eisenhutte Silesia Aktien-Gesellschaft controlled all the rights to Harmatta's United States application involved in the interference. I then went to the office of the said company, which for short I will call the Silesia Company, and opened up negotiations to purchase the Harmatta invention and rights for the United States. These negotiations resulted in my purchasing for the Thomson Electric Welding Company the Harmatta invention and the said Harmatta executed an assignment of the invention to the Thomson Company, which assignment was delivered to the Silesia Company to in turn to be delivered over to the Thomson Company when the agreement between the Thomson and Silesia companies was formulated and executed. The terms of the agreement between the said two companies were agreed upon, placed in writing, executed and delivered together with the executed Harmatta assignment.

Q. 5. Please produce copies of the Harmatta assignment and of the contract between the Silesia and the Thomson companies to which you have above referred.

A. I hereby produce a copy of an assignment from Harmatta to the Thomson Electric Welding Company of his United States application Serial No. 183,677, the said assignment being executed in Berlin, Germany, and dated the third day of February, 1912.

I also produce a copy of the agreement between the Eisenhutte Silesia Aktien-Gesellschaft and the Thomson Electric Welding Company, said agreement being dated April 3d, 1912.

(Counsel for plaintiff offers in evidence a Patent Office certified copy of the said assignment, and the same is marked "Plaintiff's Exhibit No. 14, Harmatta Assignment".)

(Plaintiff's counsel also offers in evidence a copy of the agreement between the Eisenhutte Silesia Aktien-Gesellschaft and the

Thomson Electric Welding Company, and the same is marked "Plaintiff's Exhibit No. 15, Copy of Silesia-Thomson Contract".)

(It is agreed between counsel for the respective parties that the copy of said contract may be used with the same force and effect as the original thereof, and the plaintiff agrees to produce the original thereof for the inspection of defendant's counsel on reasonable notice and to have it in court when requested.)

Q. 6. Did you sign the said contract on behalf of the Thomson Company?

A. I did; I had a power of attorney from the Thomson Company authorizing me to conclude an agreement with the owners of the Harmatta invention for the United States, and gave that power of attorney to the Silesia Company as my authority to sign on behalf of the Thomson Electric Welding Company.

Q. 7. What moneys, if any, did you pay to the Silesia Company?

A. I made a payment of $7,500 to the Silesia Company as the first payment called for under the agreement above referred to.

Direct examination closed.

No cross-examination.

Deposition closed.

C. F. TISCHNER.

Attest: GEORGE C. BROWN,

Notary Public and Special Examiner.

District Court of the United States, Eastern District of Michigan, Southern Division.

THOMSON SPOT WELDER COMPANY
vs.
FORD MOTOR COMPANY.

Testimony Taken on Behalf of Plaintiff.

Met pursuant to notice at the offices of the National Enameling and Stamping Company, Baltimore, Maryland, April 28, 1919, at 11 o'clock A. M.

Appearances: ALAN D. KENYON, Esq., in behalf of the Plaintiff; MELVILLE CHURCH, Esq., in behalf of the Defendant.

Second Deposition of George W. Knapp.

Thereupon GEORGE W. KNAPP, a witness recalled on behalf of the plaintiff, testified as follows: —

Direct Examination.

By Mr. KENYON.

Q. 1. You are the same George W. Knapp, director general of the National Enameling and Stamping Company, who has testified previously in this case?

A. I am.

Q. 2. In your previous testimony you referred to a trip to Europe in 1904, in connection with Mr. Haberman. Will you kindly state how it was you and he happened to go to Germany on this trip, stating all the facts and circumstances leading up to the trip?

A. Well, about some months before this trip to Europe there was a Mr. Winkler, who was the president of the Silesian Enameling Works, and Mr. Schweisfurt; they came to this country to sell an electric welding patent. They came before our executive board with samples of stuff that was welded, such as pitchers and coffee pots and pans, and upon examining them and giving it due consideration the board thought the proper thing to do was to go to Germany and look into the thing, so Mr. Haberman and myself were deputised as a committee of two to go with power to do whatever we wanted to do in the case.

Q. 3. What kind of electric welding was it?

A. It was spot welding, an invention of a man by the name of Harmatta.

Q. 4. You are familiar with the Harmatta patent?

A. Yes.

Q. 5. And with the spot welding process?

A. Yes. [*Continuing:*] At the appointed time we went to Europe with the intention of looking the thing over. We met Mr. Winkler in Berlin and talked about our connection over there, but he would not let us see anything until we first paid for it and we went down to the Deutsche Bank and telegraphed back to America for $10,000, which was the asking price. We deposited the $10,000 and then the following day Mr. Winkler, Mr. Haberman and myself went out to Silesia and we met Mr. Schweisfurt up there and the factory manager and they took us down to the mill and the enamel shop, and showed us the whole thing working. They were riveting on saucepan handles, coffee pot handles and ears and things like that. After seeing this thing I was very much pleased with it. It was really a kind of revelation to see the simplicity with which they were doing those things, putting these things on. We went back to Berlin and we stayed in Silesia a couple of days and then we went back to Berlin and had the agreements drawn up for which we had turned over the $10,000 and signed the agreements which we had a copy of. Shortly after we returned to America.

Q. 6. Referring to what Winkler and Schweisfurt showed you, and the other members of the executive committee of the National Enameling and Stamping Company, just what did they show you when they were trying to interest you in the invention here in this country before you went abroad?

A. They brought samples of ware that was welded, such as water pitchers and coffee pots and saucepans and stewpans. They had quite a bunch of stuff. I remember that much of it. I tried to get one of them from them, but they would not give any to me. I wanted to take it home to show to everybody else.

Q. 7. What they showed you was ware that had spot welded joints?

A. Yes.

Q. 8. Did they describe the process to you while they were in this country before you went abroad?

A. No; just gave us a general outline, but they would not give us the trick, you know.

Q. 9. Do you mean they would not tell you how the welding was done?

A. No; they showed us the goods. If I had known how it was done I would not have gone to Europe, but would have tried it myself.

Q. 10. Then when you saw this spot welded ware which Winkler and Schweisfurt showed you in 1904 you did not know how the spot welding was done?

A. No; we had never seen anything of that kind before.

Q. 11. And you did not know how to produce such spot welded ware?

A. No; we did not know how to produce it by any of the known methods that we were acquainted with.

Q. 12. How did it strike you when you saw this spot welded ware, as a good thing or not?

A. Struck me as a very good thing.

Q. 13. In your testimony you refer to certain advantages of spot welded ware over rivetted ware. State what those advantages are.

A. The advantages of spot welding over rivetting, you can use a very much lower grade of labor. To rivet, a fellow has to be somewhat of an expert to do fairly good rivetting, while the spot welding is very much easier and the efficiency is very much greater. In the spot welding you save the rivets and often save the perforations in the vessel where the handle or spout or ear was to be attached. As regards the enameling of the article that was welded, with the rivetted ware frequently the enamel would come off of the head of the rivet. The rivets sometimes were made of a different class of steel from what the article was made and the enamel would come off the head or come off the point where it is rivetted down. In that case it makes seconds and has to be sold at a very much lower price.

Q. 14. In a general way, how would the wages of rivetters compare with the wages of those who work on the spot welding machines?

A. The rivetters would get two or three times more wages than the spot welders.

Q. 15. How about the amount of output of finished goods between the rivetting process and the spot welding process?

A. You could weld three or four times more than you could rivet, that is, taking the general run of stuff that is rivetted. Some things are harder to rivet and some things are easier to rivet, but making the comparison between the electric welding and that, I should say three or four times faster with the electric welding.

Q. 16. In the class of goods that are spot welded of the kind that your company put on the market how does your company, the National Enameling and Stamping Company, stand so far as its size or amount of output of such goods compared to other concerns in the same line of business?

A. Well, the National Enameling and Stamping Company comprises five of the largest factories in the United States with a combined capitalization of $30,000,000. I don't know of any other concern one-half as big or one-quarter as big. I don't know of any other large concern.

Q. 17. It is the largest, then, in its line?

A. Yes, in its line of business in the United States.

Q. 18. How were you making the joints in 1904 at the time Winkler first showed you the spot welded goods? I refer to such goods as your company was then turning out.

A. We were rivetting, also double seaming. Double seaming is locking the sheets together at points, which takes several operations. For instance, like putting a lip on a coffee boiler, we had to double seam them in and it was five or six operations, where the electric welding process it was done with one operation, as it were.

Q. 19. Today, what is the fact? What process do you use in fastening joints on to the vessels that you make?

A. On all black ware for enameling we electric weld, spot weld. Tinware we rivet yet.

Q. 20. Then today on the iron and steel ware you do not use rivetting at all?

A. No, we do not use any rivetting any more on that. The electric welding has entirely superseded that.

Q. 21. When did you and Mr. Haberman return from Europe on this visit in 1904?

A. I have looked at a copy of a letter I wrote to the president

of the National Company which was dated January 3d, 1905, so I must have returned to America before writing this and other letters.

Q. 22. You were back before the date of that report, then?

A. Oh, sure; took me a little time to think all this up.

Q. 23. How soon after your return did you receive the two spot welding machines that you bought in Germany? I merely want your general recollection.

A. I think in about a couple of months.

Q. 24. Did you know how the other factories of the National Enameling and Stamping Company have been supplied with spot welding machines?

A. All the spot welding machines that the National Enameling and Stamping Company uses are made in the Baltimore branch, and we furnish them to them as they wanted them.

Q. 25. From your general recollection, how soon after you received those two machines from Europe did you begin to make machines for the other factories of the National Enameling and Stamping Company?

A. We started immediately upon our return getting our drawings and everything in shape for the wants of the other factories of the National Company.

Q. 26. In your previous testimony you referred to certain advantages on the finished goods. How about the question of seconds when you use the spot welded process as compared with using the rivetted process?

A. We made a few more seconds in the rivetted process than we did with the electric welding process.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 27. In your application of the spot welding process you sometimes make a continuous waterproof seam, don't you?

A. Yes.

×-*Q.* 28. How early did you begin to do that with your spot welding machine?

A. We did not do that with the spot welding machines. That is a different process.

×-*Q.* 29. Describe that.

A. That is a roller process; there are two rollers, one underneath and one above, and the sheet passes between the two rolls.

×-*Q.* 30. And there is contact—

A. All the time with pressure.

×-*Q.* 31. While the current is going through?

A. Yes, sir.

×-*Q.* 32. Did you see that process worked in Germany when you were there on your first trip?

A. No; they told me that was a part of another patent when they introduced the side seaming, though I did not see anything of it.

×-*Q.* 33. Did you have any rights to use that process of welding by means of rollers?

A. No, we had no rights; we just did it.

×-*Q.* 34. When did you commence to do it in this country?

A. We did that about 1906 or 1907; somewheres about there.

×-*Q.* 35. And you have done it ever since.

Mr. KENYON. I object to that as not proper cross-examination, as immaterial, irrelevant and incompetent. This objection is made once for all.

A. Yes.

×-*Q.* 36. When you got these rights from the German company to practice this process of electric welding in this company did you know that they had an application for a patent pending in this country covering that process?

A. Yes.

×-*Q.* 37. Did they show it to you?

A. They told me if it was issued it was to be a part of the National's property.

×-*Q.* 38. Did they give you a written license?

A. No; there was not anything to give then.

×-*Q.* 39. Did they give you a license under the application for the patent that was pending?

A. Spot welding; yes.

×-*Q.* 40. Was it a written document?

A. Yes.

×-*Q.* 41. I wish you would produce that if you have it.

A. That was the agreement [*producing paper*].

Mr. CHURCH. You have produced here a copy of an agreement

dated December 3, 1904, between the Silesia Company of the one part and the National Enameling and Stamping Company of the other part. I request that a copy of this paper be offered in evidence by the plaintiff, the original to be produced if required at the trial of the cause.

Mr. KENYON. Counsel for plaintiff has no objection and offers the copy in evidence, the original to be produced if called for. I request that the copy be marked "Plaintiff's Exhibit No. 16, Silesia Agreement with the National Enameling and Stamping Company of December 3d, 1904".

(Copy of agreement having been offered in evidence was marked by the stenographer "Plaintiff's Exhibit No. 16, Silesia Agreement with the National Enameling and Stamping Company December 3d, 1904", and will be found attached to these depositions.)

×-*Q.* 42. Where was this agreement of December 3d, 1904, executed?

A. In Berlin.

×-*Q.* 43. And who was your representative there, who took part in the negotiations,—I mean your counsel?

A. He was a correspondent of Samuel Untermyer; I cannot think of his name. I hardly know where to pick that out unless it is on that agreement.

×-*Q.* 44. I note the name of a witness here on the agreement which appears to be Otto Lubowsky. Was that the name of your representative at this Berlin conference?

A. I could not answer that.

×-*Q.* 45. I notice in this agreement a reference to the electric welding process by means of which sheets of iron, steel or metal of great thinness are welded together as a substitute for seaming, jointing or any other manner of putting together two or more parts of ware. Was the subject of electric seaming referred to in this very general conference that you had with the German representatives in America and before you went over?

A. No, that was not mentioned in America at all.

×-*Q.* 46. But it was mentioned further after you got into Germany?

A. Yes, it was in Germany.

×-*Q.* 47. What was said about it?

A. They said they had another patent which did not pertain to the spot welding that would hereafter be completed and offered for sale, but gave us to understand it was not what we were buying.

×-*Q.* 48. Who was your American patent counsel at the time this agreement was executed?

A. We did not have any patent counsel. Guggenheim, Untermyer and Marshall were our attorneys.

×-*Q.* 49. You did not have then any patent counsel?

A. No.

×-*Q.* 50. Did your attorneys have access to the application for patent that was then pending here in the United States Patent Office on electric spot welding?

A. I cannot say positively. It is likely they had, but it has been so many years ago and those lawyers have moved from one place to another, and whether they kept all the data I cannot say.

×-*Q.* 51. You don't think it likely you would have entered into the contract in respect of American rights without someone having examined the United States application?

A. Yes, that is right; went through Guggenheim, Untermyer and Marshall's office. They are our retained counsel for anything.

×-*Q.* 52. When you began to practice this electric seaming process in this country who instructed you how to do it?

A. I invented it myself and I had a couple of machines running in the factory, but in no other factory of the National Company.

×-*Q.* 53. Did you take a patent on it?

A. No.

Mr. KENYON. Objected to as before.

×-*Q.* 54. Did you ever apply for a patent on it?

A. No.

×-*Q.* 55. Did not think it was a patentable invention?

A. I did not think at all about it, you know; some of us manufacturers, when we obtain a thing we give it to the world.

×-*Q.* 56. That electric seaming process by the use of rollers has been quite extensively used in this factory, has it not?

A. We have two machines running in this factory for a number of years.

×-*Q.* 57. It is a practical thing then to make a continuous seam

between two pieces of thin metal by the use of rollers applying pressure and the electric current?

A. It is not quite as easy as you would imagine, as the material has to be prepared before seam welding.

×-*Q.* 58. That is to say, the surfaces have to be very clean?

A. Yes, to make perfect seam.

×-*Q.* 59. How do you clean them?

A. Pickle them.

×-*Q.* 60. Are you aware, Mr. Knapp, that the application for patent which was owned by the Silesia Company and pending here in the United States when you made this agreement of December 3d, 1904, showed a mechanism for producing continuous seams as well as a mechanism for producing or welding the sheets at separated spots?

Mr. KENYON. I object to that as not proper cross-examination and wholly immaterial, irrelevant and incompetent.

A. No, it did not. It is an entirely different machine from spot welding.

×-*Q.* 61. While you were in Germany were you shown a copy of the application or of the patent that had been filed or granted in Germany for the electric welding process of the Silesia Company?

A. No; I don't think they had any patent there.

×-*Q.* 62. Did they have any patent on it anywhere in any country?

A. I think they had in England; I am not positive of that though.

×-*Q.* 63. Did they show you the English patent?

A. No.

×-*Q.* 64. Do you recall whether they had any patent granted in France?

A. No; there was not anything like that referred to.

×-*Q.* 65. Didn't you think you were paying a large sum of money for the right to use in America an unpatented process?

A. The patent if it had gone to issue would have been worth more than what we paid for it. We took the gambling chance of it going to issue. The shop right was worth considerable to us, so we could go right to work on it with the agreement we had with them.

×-*Q.* 66. When, at the first interview with the Silesian people

in America in 1904, they showed you specimens of electric welding that had been done by them, was there among those specimens a sample of a continuously welded seam?

A. No; they had not brought that to any state of perfection when I was there.

×-*Q.* 67. I am speaking about what transpired in America.

A. No; there was not anything said about it at all.

×-*Q.* 68. Will you please describe with a little more particularity the appearance of the things that were shown you at that time which had been electrically welded?

A. Watering cans with handles were welded at the top and bottom. Kettles with ears were welded to a cylindrical vessel. Handles to dishpans were welded. That is the line of stuff they had carried with them.

×-*Q.* 69. You have not described as a thing shown you two superposed thin metal plates united by electric welding. Did they show you anything of that sort?

A. No; just the finished article.

×-*Q.* 70. And in each instance there was something of cast or raw metal or stamped metal welded to a sheet of metal; is that correct?

A. This was all sheet metal they exhibited except the dishpan handles, and they were wire. They were about No. 0 wire; about as big as the handle of that pen.

×-*Q.* 71. How were they attached, by welding?

A. All handles were flattened on the end by a press and put against the body of the vessel between the electrodes of the welding machine and pressed down.

×-*Q.* 72. That is the way they were described as having been applied?

A. That is the way it looked. They would not tell us too much.

×-*Q.* 73. They did not show you at that time?

A. Had no machine in America.

×-*Q.* 74. They simply described generally how it was done without disclosing a machine?

A. They did not tell us much about that. They set the goods in front of us and let us look at them. They wanted $30,000 at

first. I never forgot that because I pretty near fell off the stool I was sitting on.

×-*Q.* 75. You have not told us at how many points any of these articles that were shown you at that time were welded.

A. The watering cans were welded twice at the top and apparently once at the bottom with the handle. The ears of the kettles appeared to be welded. Each ear had two spots on it, one on either side, and the handles of the pans appeared to have one spot on either side of the handle.

×-*Q.* 76. Did anybody ever attempt to interfere with your use of this electric welding process?

Mr. KENYON. Objected to as immaterial, irrelevant and incompetent and not proper cross-examination.

A. We had been threatened a half a dozen times. They never went very far, though.

×-*Q.* 77. You were threatened by the Universal Electric Welding Company, were you not?

A. I think that is what it was.

×-*Q.* 78. Did they ever bring suit against you?

A. Yes.

×-*Q.* 79. Where was that started?

A. In New York.

×-*Q.* 80. And they sued you under the so-called Rietzel patent?

A. No; I could not tell what they were suing under because we did not use the Rietzel patent.

×-*Q.* 81. Were you ever threatened with suit by the Thomson Electric Welding Company?

A. I cannot say positively. We might have been.

×-*Q.* 82. As a matter of fact, didn't the Thomson Electric Welding Company bring suit against your company?

A. I think they did; I could tell that out of Untermyer's office.

×-*Q.* 83. That was brought in New York also, wasn't it?

A. Yes, sir.

×-*Q.* 84. Isn't it a fact that the Thomson Electric Welding Company and the Universal Electric Welding Company jointly brought a suit against you?

A. That might have been; you are putting too hard questions. All I know is about the patent.

×-*Q.* 85. Didn't the Universal Electric Welding Company or the Thomson Electric Welding Company, or both of those companies, give your company a license?

A. They offered us the privilege of using all they had if we would give them the privilege of using what we had, and that is all the agreement I know.

×-*Q.* 86. Was that arrangement carried out?

A. Yes.

×-*Q.* 87. When?

A. I don't know when that agreement was made.

×-*Q.* 88. I wish you would look and see and bring the agreement if you have got it.

(Witness here left the room and produced two copies of agreements.)

×-*Q.* 89. You have produced copies of two agreements, one dated the third day of August, 1912, between Thomson Electric Welding Company and the American Electric Welding Company, and the other dated June 10th, 1914, between the Thomson Electric Welding Company and the American Electric Welding Company. Will you consent that copies of these agreements may be offered in evidence?

A. Yes.

Mr. CHURCH. The defendant offers in evidence the two agreements referred to, the first to be marked "Defendant's Exhibit Agreement of August 3d, 1912, between Thomson Electric Welding Company and American Electric Welding Company", and the other to be marked "Defendant's Exhibit Agreement of June 10th, 1914, between Thomson Electric Welding Company and American Electric Welding Company".

(Copies of agreements referred to were marked by the stenographer in accordance with counsel's request and will be found at the end of these depositions.)

×-*Q.* 90. Is there any agreement between your company, the National Enameling and Stamping Company, and the Thomson Electric Welding Company and the Universal Electric Welding Company?

A. There was an agreement made; yes.

×-*Q.* 91. Will you produce a copy of that, please?

A. The agreement of June 10th, 1914, includes all the copies you mention.

×-*Q.* 92. Did you have anything to do with the negotiations of either of the agreements that has been offered?

A. No.

×-*Q.* 93. As the result of the adjustment of differences between your company and the Thomson Electric Welding Company and the Universal Electric Welding Company, all the suits that have been brought against your company by these other companies were dismissed, were they not?

A. They were, to the best of my knowledge and belief.

×-*Q.* 94. Has your company today a specific license or licenses under the Harmatta patent No. 1,046,066, of December 3d, 1912, upon which this suit is brought?

A. Yes.

×-*Q.* 95. Has the National Enameling and Stamping Company a license under the Harmatta patent in suit from the Thomson Spot Welder Company, the plaintiff in this suit?

A. I cannot answer that; I don't know.

Testimony of witness concluded.

Signature of witness and certificate waived.

Second Deposition of William A. Herring.

Thereupon WILLIAM A. HERRING, a witness called on behalf of the plaintiffs, testified as follows:—

Direct Examination

By Mr. KENYON.

Q. 1. You are the same William A. Herring who previously testified in this case?

A. Yes, sir.

Q. 2. In your prior testimony you refer to certain machinery purchased by Mr. Knapp when in Germany, and you were asked to state in a general way the approximate time of the arrival of this machinery here at the factory of the National Enameling and Stamping Company and you answered: "I judge it was about five years ago. I may be mistaken on that; that is only approximately." What can you say as to the correctness of this answer?

A. Well, that is incorrect. I know it to have been longer in

the factory than the date that I testified; as you say, longer than that, and in my judgment it was something around fifteen years from the date of my previous testimony.

Cross-examination waived.

Testimony of witness concluded.

Signature and certificate waived.

Deposition of George W. Knapp, Jr.

Thereupon GEORGE W. KNAPP, Jr., a witness called on behalf of the plaintiff, testified as follows: —

Direct Examination.

By Mr. Kenyon.

Q. 1. You are connected with the National Enameling and Stamping Company at their Baltimore factory, are you not?

A. Yes, sir.

Q. 2. In what capacity?

A. As factory manager.

Q. 3. How long have you been connected with the company in the factory?

A. For about nineteen years.

Q. 4. Have you been factory manager all of that time?

A. No, sir; have been factory manager for about seven or eight years.

Q. 5. And before that what was your work here?

A. Well, before that I had charge of the factory office, which looked after purchases, cost and all matters pertaining to the running of the factory.

Q. 6. Has your work been such during all of this time as to make you generally familiar with what is done in the factory and processes and machinery used there?

A. Yes.

Q. 7. You are familiar with the spot welding process used at the factory?

A. Yes.

Q. 8. Do you recall the spot welding machines which your father purchased in Germany?

A. Yes.

Q. 9. About when was that, as far as you can tell from your memory; when were they received here?

A. Let us see; they were received some time in 1905.

Q. 10. What has been the practice of the National Enameling and Stamping Company about the manufacture of other spot welding machines like these two received from Germany; where have they been made?

A. Well, a great many — I won't be positive about all of them — but the most of them have been made at this factory under the supervision of the director general of factories and shipped to the different branches where they would be used.

Q. 11. Did you, in those early days, made and ship any of these spot welding machines to Long Island or Laurel Hill factory of the National Enameling and Stamping Company?

A. Yes.

Q. 12. What date did you ship them?

A. We have shipped at several times and we have shipped as early as April, 1907.

Q. 13. How do you fix that date, April, 1907?

A. I fix the date from a memorandum book that I keep in the office, which book is not used for billing or anything having to do with the office here, but is kept as a matter of reference in case the director general wants to know when certain goods are shipped to certain branches; I could get that information out of this little memorandum book I have kept without going through a great lot of records, and I looked at this book and got the date when we shipped the fifteen machines to New York, or the Berlin factory in New York.

Q. 14. Will you produce the book?

A. Yes.

(Witness here leaves the room and returns with memorandum book which he hands to counsel.)

Q. 15. Will you point out the memorandum in this book that you referred to as the shipment of the machines to the Berlin factory?

A. Here it is [*indicating in book*].

Q. 16. In whose handwriting is this entry?

A. Mine.

Q. 17. In whose handwriting are the various entries in this book both before it and after it?

A. My writing.

Q. 18. Did you make this entry about the shipment to the Berlin factory of April 27th, 1907?

A. I made that on April 27th, 1907.

Q. 19. Are you able to state positively after refreshing your recollection from this entry that you made this entry on that date?

A. Yes.

Q. 20. Are you able to state that these fifteen machines referred to in it were shipped to the Berlin factory on that date or about that date?

A. They were shipped about that date. I won't be positive it was that date, but it was within a few days of it.

Q. 21. What were these machines that is referred to in this entry?

A. Fifteen machines in all, thirteen of what we call vertical machines,— the ones that go straight up and down,— and the two rotary machines were the ones that worked over sideways.

Q. 22. What kind of electric welding machines were they?

A. They were all spot welding machines.

Q. 23. And the vertical type was like one of the machines received from Germany?

A. Each one was like the machines we received from Germany. We coined those words ourselves to designate the different types.

Q. 24. And the thirteen vertical machines, how did they compare with the vertical machines you received from Germany?

A. They were the same.

Q. 25. And the two rotary ones were like the rotary one received from Germany?

A. Yes.

(By consent, it is stipulated that the entry may be entered upon the record.)

Q. 26. "April 7th — *Berlin.*
"Electric welding machines.
"Thirteen vertical.
"Two rotary at $300 each $4500."

Q. 26*a*. What does "Berlin" refer to in this entry?

A. That is the way we designated our Long Island factory.

Q. 27. Where is that factory located on Long Island?

A. We have sometimes called it Laurel Hill factory, but at the present time they call it Maspeth Post Office.

Q. 28. Why was this factory called the Berlin factory?

A. Because the factory was located at a place known as Berlin village.

Q. 29. Is that the factory that Mr. Richman has charge of?

A. Yes.

Q. 30. Was this the first shipment of these spot welding machines made to this factory or to any other factory of the National Enameling and Stamping Company, or were there earlier shipments.

A. There was one shipment made about April 15th, 1907, to the Granite City factory, of Granite City, Illinois.

Q. 31. Does an entry of that appear in this same memorandum book in your handwriting under that date?

A. Yes.

Mr. KENYON. The book is offered to counsel for defendant for his examination.

Cross Examination.

By Mr. CHURCH.

X-*Q.* 32. Your father in his examination today has referred to certain electric welding machines for welding continuous seams that have been used in this factory since 1906 or 1907, I think he said. To what particular uses have those machines been put? I mean describe the kinds that have been welded together by means of them.

Mr. KENYON. I object to that as not proper cross-examination, as wholly immaterial, irrelevant and incompetent and improper.

A. As far as I know, those machines were used for welding side seams of articles.

X-*Q.* 33. What articles?

A. I should say pots or kettles.

X-*Q.* 34. How about spouts on coffee pots and things of that sort?

A. Well, we don't put spouts on coffee pots. We put lips on coffee pots and spouts on tea pots. The lips of coffee pots can be welded by the seam process.

X-*Q.* 35. In this seam you employ rollers constituting the electrodes, do you not?

A. In some instances they are rollers.

×-*Q.* 36. And the rollers where used are employed for applying both pressure and current, are they not?

A. As far as I know.

×-*Q.* 37. You are in charge of this factory and you ought to know. You do know, don't you?

A. That is the purpose, as far as I know, it is used for.

×-*Q.* 38. There is nothing, then, impracticable about the use of rollers for electrically welding continuous seams is there?

Mr. KENYON. I object to this line of testimony as not proper cross-examination, as wholly immaterial, irrelevant and incompetent.

A. I should not think so.

Testimony of witness concluded.

Signature and certificate waived.

District Court of the United States, Eastern District of Michigan, Southern Division. In Equity.

THOMSON SPOT WELDER COMPANY, Plaintiff,
Against
FORD MOTOR COMPANY, Defendant.

Harmatta Patent No. 1,046,066.

Depositions taken on behalf of the plaintiff, pursuant to notice, at Laurel Hill, Long Island, New York, before Edwin Seger, a notary public in and for Queens County, at the office of the National Enameling & Stamping Company, on Monday, May 5, 1919, at 10.30 A. M.

Present: ALAN D. KENYON, Esq., Counsel for Plaintiff;
MELVILLE CHURCH, Esq., Counsel for Defendant.

Deposition of Charles H. Schwing.

CHARLES H. SCHWING, a witness called on behalf of plaintiff, having been duly sworn, testifies as follows: —

Direct Examination.

By Mr. KENYON.

Q. 1. What is your name, age, and residence?

A. Charles H. Schwing; thirty-six years of age; 58 95th Street, Woodhaven, Long Island.

Q. 2. And your occupation?

A. Is general bookkeeper.

Q. 3. For whom?

A. For the National Enameling & Stamping Company.

Q. 4. At what office?

A. At the New York office, 413 Fifth Avenue.

Q. 5. Testimony has been given in this case that the Baltimore branch of your company shipped fifteen spot welding machines to the Berlin branch or Long Island branch of the company. Have you any records in your books of the sending of any machinery by the Baltimore branch to the Long Island branch along in April or May, 1907?

A. I have; by the records of the expenditure book.

Q. 6. Will you point out the item that you refer to in the expenditure book?

A. [*Witness indicating.*] In the month of April the entry shows here "Baltimore Purchase Account of Machinery, Tools & Fixtures", credited to the Baltimore branch, and charged to our "Improvements & Additions Account, Analysis Book", showing that it called for machinery.

Q. 7. You have referred to another book as the analysis book. What book is that?

A. It is simply to analyze the expenses of the expenditure book.

Q. 8. Those two books are the books now before us, are they?

A. They are the same.

Q. 9. In whose handwriting are they?

A. They are in my own handwriting.

Q. 10. Will you please read upon the record the complete entry that you have referred to in the expenditure book, and also the complete record in the analysis book?

A. "New York Branch (Comprising Berlin Factory and New York Store) Expenditure Book." The entry reads: "April 31st — Voucher No. 1686 — Baltimore Purchase A/C." Particulars: "M. T. & F.", meaning "Machinery Tools & Fixtures". The posting, folio is "No. 159". The local account of the credit ledger was credited with $4,500, and it was charged to our "Improvements &

Addition Account" of $4,500. Accounts debited, "Improvements & Additions", under Berlin, "$4500."

The analysis book is headed: "New York Branch — Analysis of Expenditures." It is simply dated as "April 1907". Name of factory: "Baltimore." "No. 1686." In the total column is "$4500", and then the "Analysis of Improvements & Additions" under the "Analysis of Machinery, Tools & Fixtures" is "$4500."

Q. 11. What is the heading of the year at the top of the page in the expenditure book?

A. The date of 1907, in the month of April.

Q. 12. All the items on that page are of April, 1907?

A. All of April, 1907.

Q. 13. And in the analysis book?

A. In the analysis book also April, 1907.

Q. 14. In the analysis book, in the column headed "Name of Factory", appears a capital B at the top of the column. What does that mean?

A. Baltimore.

Q. 15. The entry in this analysis book of the $4,500 in the column under "Improvements & Additions" of "Machinery, Tools & Fixtures", indicates what?

A. Indicates that the entry of $4,500 applied to machinery, tools or fixtures, and not to any of the other analyses as stated in the improvements and additions account.

Q. 16. Does that mean machinery, tools and fixtures sent by the Baltimore plant to the Long Island plant?

A. It means that the entry in the expenditure book, which is the one that is approved by the auditors, shows that it came from Baltimore purchase account — at least was credited to Baltimore — that is, came from the Baltimore branch.

Q. 17. In the expenditure book, in the heading you have referred to, appears the word "Berlin". What does this mean?

A. That means the Berlin — what we term the Berlin — factory, or this Laurel Hill plant here.

Q. 18. This plant we are in today on Long Island?

A. Yes; that is called the Berlin plant.

Q. 19. Now, of your own knowledge, do you know what this

machinery consisted of for which a charge of $4,500 was made on April 31st?

A. No, sir, I do not.

Q. 20. Mr. Knapp has testified that fifteen spot welding machines were shipped from the Baltimore factory, or were ordered shipped, in April, 1907. Have you any receipt or invoice at the New York office showing the receipt of those goods here at this factory?

Mr. CHURCH. Objected to as calling for secondary evidence.

A. No, I have not, outside of the fact that the entry is made in the books here, showing that the machines were received here.

Q. 21. In the regular practice in those days, was an invoice or receipt sent for these goods?

A. Yes, an invoice would be sent from the branch and would come to our branch first. All mail is addressed to the New York general office. It is then registered and distributed to the plant at Berlin for approval. When the goods come in and are passed upon by those in charge, the invoice is returned to be entered into the controlling accounts at the New York office, because all the finances are handled from there.

Q. 22. Have you looked to see whether you could find such an invoice or receipt?

A. Yes, I made two separate investigations. We haven't got it in New York, and I came over here myself and looked through our plant and buildings here to find invoices or whatever information I could, but this was all we could come across.

Q. 23. You weren't able to find the invoice or receipt?

A. No; it is too far back for a small paper.

Q. 24. You looked in all the places where it was likely to be?

A. In all the places where it was likely to be. There were only three places where it would be likely to be kept, and I spent my time trying to find it there.

Q. 25. Does this entry here in the two books you have referred to under April, 1907, necessarily mean that the machinery was received here at the Long Island factory in April?

A. No, it does not.

Q. 26. Will you explain about that?

A. In almost any kind of a case, and particularly mentioning

this one here, an invoice would be billed out, we will say, from our Baltimore plant. It would come here without question the following day. (It takes that about for the length of the mail.) It takes a day for it to come from the New York office over here. (We only use two boys a day in carrying mail back and forward.) An invoice is kept here for a period of several days,— maybe five or ten days,— until the goods arrive. The invoice being passed upon, it is sent back to the New York store to be entered up. We have made it a practice to try to get all the invoices pertaining to one month in the month to which it belongs. It does not mean to say, because it is dated April 31st, that we waited until the last day of April. This entry may not have been made until the tenth or fifteenth day of the month.

Q. 27. What month?

A. The month of May,— the following month.

Q. 28. So that the goods may have been received in May and yet they would appear in this book as charged under April?

A. Absolutely.

Q. 29. That was because of the date of the invoice, I presume?

A. We try to keep all the plants to balance with each other during the month.

Q. 30. Do you keep your books open indefinitely in case a shipment is delayed?

A. We are very apt to keep them open a day or two longer, if it is very important, in order to get our expenses in for the month.

Q. 31. Would you keep them open all through the month of May?

A. No, absolutely.

Q. 32. So, judging from your entries, it must have been received during the month of May?

A. I would say before the 15th anyway; I don't know of an instance where they kept it longer than the 10th or 12th before the books were closed.

Direct examination closed.

Deposition closed.

Deposition of Charles J. Timms.

CHARLES J. TIMMS, a witness called on behalf of plaintiff, having been duly sworn, testifies as follows: —

Direct Examination.

By Mr. KENYON.

Q. 1. What is your name; age; and residence?

A. Charles J. Timms; age, fifty-two; 731 Hancock Street, Brooklyn.

Q. 2. And what is your occupation?

A. General clerk and in charge of receiving at the Laurel Hill branch of the National Enameling & Stamping Company.

Q. 3. How long have you occupied that position?

A. About twenty-four years.

Q. 4. What kind of work is included under your supervision?

A. To check the invoices for any goods that we purchase; to check them and to pass them to Mr. Richman, who pays them on my checking.

Q. 5. Do you mean that you take an invoice for goods and check it up to see that the goods have actually been received, and then turn it over to Mr. Richman?

A. Yes, then turn it over to Mr. Richman.

Q. 6. Do you recall the receipt at the factory here of fifteen spot welding machines sent by the Baltimore factory?

A. I do.

Q. 7. From your general recollection, how long ago was that?

A. I should say from ten to twelve years ago approximately.

Q. 8. Did you have any particular occasion to remember this particular shipment?

A. Yes, sir; this was a new machine that we had never had in the plant before, and the quantity of fifteen pieces coming in at one time impressed itself very plainly upon my memory.

Q. 9. So that you have a distinct recollection, independent of any records, of the receipt of these goods ten or twelve years ago?

A. Positively.

Q. 10. I call your attention to entries in the expenditure and analysis books that Mr. Schwing has testified to. You were present during the taking of this testimony, were you not?

A. Yes, sir.

Q. 11. Now, referring to those, while you did not make them, can you tell what class of machinery or kind of machinery is referred to, and is there any way or indication that would help you?

A. Only from a general knowledge of the amount of money,—of the $4,500,—fifteen machines at $300, charged to improvements and additions. Mr. Schwing would have put it under the heading that we would mark for it; if it was improvements and additions, he would have put it under that classification; he would have to mark it under the exact classification that we have, and the exact amount of $4,500.

Q. 12. What kind of machines do these two entries refer to, as far as you can tell?

A. To welding machines.

Q. 13. Spot welding machines?

A. Spot welding machines; yes.

Q. 14. The first batch you received at the factory?

A. Yes.

Q. 15. These two books show the date as in April, 1907. Does that concur with your general recollection as about the time that those goods were received here?

Mr. CHURCH. Objected to as leading.

A. I should say about the early part of May the goods were received.

Q. 16. What year?

A. 1907.

Q. 17. Do you know what charge was made for each of these machines?

A. Some at $300.

Q. 18. That was the customary price for spot welding machines?

A. That was something new and impressed itself so upon my mind at the time.

Q. 19. You have charge of the invoices and receipts at the factory here on Long Island, I take it from your testimony; is that so?

A. Yes, sir; and we send them over to New York.

Q. 20. And before you send them you check them up to see if the goods have been received?

A. If the goods have been received and O. K.

Q. 21. Have you looked for any invoice or receipt of these fifteen spot welding machines that were received from Baltimore in the spring of 1907?

A. Yes, sir; we made a thorough search, but on account of length of time we are unable to find it.

Q. 22. Have you looked everywhere that it would be likely to be?

A. Yes, sir, everywhere that it would be likely to be.

Direct examination closed.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 23. You remember distinctly the receipt of these fifteen spot welding machines, I understand?

A. Yes, sir.

×-*Q.* 24. And they made an impression upon you because they were the first of the kind you had ever seen?

A. Yes, sir.

×-*Q.* 25. Describe one of them.

A. A machine in place of the ordinary way of taking a hammer and rivetting what they call "rivets" on to a handle with the hammer by hand. This does the work automatically on a machine. They simply put the handle in place on the article to be rivetted and the machine comes down and welds it on itself without the use of any rivets.

×-*Q.* 26. Is that the best description you can give of one of those machines?

A. Well, it is,—I don't quite get your meaning. It is a long iron machine.

×-*Q.* 27. Suppose you explain it a little more particularly. I want to see how good your recollection is of the construction of that machine. Do your best.

A. It is pretty hard to explain a thing like that. You take a handle of an article to be rivetted on a machine and place the article to be rivetted under this, and bringing the machine down — the top of the machine down — that welds the handle of the article on to the article to be rivetted, in place of doing it by hand. It is a long upright,— quite a large upright machine.

×-*Q*. 28. You say you brought down the machine. What part of the machine struck the handle?

A. The top part of the machine would certainly strike the handle.

×-*Q*. 29. What was the nature of that?

A. I couldn't tell you the technical term. I am not a machinist; I am simply a general clerk in charge of receiving. I simply know the general operations; I don't know the technical terms.

×-*Q*. 30. The truth is you could not describe the construction and mode of operation in detail?

A. Not technically, because I am not a machinist.

Cross-examination closed.

Redirect Examination.

By Mr. KENYON.

RDQ. 31. You have seen these machines in operation?

A. Certainly.

RDQ. 32. Tell what the man does in spot welding a lip on to a vessel like a teapot or a coffee pot; tell just what the man does, the various operations he goes through.

A. One of the operations is putting the handle on to a bowl,— take a saucepan bowl,— it is one part, and then take the handle, which is another part. By putting the two articles in the machine and bringing the machine down that makes one article out of the two parts, the handle and the bowl.

RDQ. 33. What does the workman do to bring the machine down?

A. Presses his foot down; that causes the electricity to go through the machine.

RDQ. 34. What is the shape of the part of the machine that is brought down? What does it look like?

A. Well, I should imagine something of a block,— I should call it block form. I would not answer those questions; I am not technical enough for that purpose.

RDQ. 35. The part that strikes the lip that is being fastened to the basin, what is the shape of that; just the part that strikes the lip?

A. I should call it concave,— I wouldn't know what to call it. You see my business is simply the receiving end of the department. I know what the thing is for and for what it is used.

RDQ. 36. You know when you see a spot welding machine?

A. I know when I see a spot welding machine; yes, sir.

Redirect examination closed.

Recross Examination.

By Mr. CHURCH.

R×-*Q.* 37. When these fifteen machines were received, were they all put in the same room?

A. Yes, sir.

R×-*Q.* 38. That room was open to the public, was it not?

A. No, sir; that is in our engine room.

R×-*Q.* 39. Were special arrangements made to guard that from the view of the public, that room containing those spot welding machines?

A. Only those who have business there would go into that department.

R×-*Q.* 40. Well, you didn't try to keep the use of those machines a secret, did you?

A. I know they were put into the room; that is all that I know, and that they were kept in a part that nobody would go into unless they had business there.

R×-*Q.* 41. Were those spot welding machines all alike?

A. To the best of my knowledge, I should say yes, they looked to me to be the same.

R×-*Q.* 42. Your recollection does not enable you to recall any difference between them; they looked all alike to you?

A. There were fifteen machines received; fifteen welding machines.

R×-*Q.* 43. And, now, do you rely upon what you find in the book upon that subject, or upon your memory?

A. Partly from the books, a great deal from memory; they were something entirely new, so it impressed me when they came in.

Recross-examination closed.

Deposition closed.

Deposition of William B. Heron.

WILLIAM B. HERON, a witness called on behalf of plaintiff, having been duly sworn, testifies as follows: —

Direct Examination.

By Mr. KENYON.

Q. 1. What is your name, age and residence?

A. William B. Heron; fifty-four years old; 149 Harmon Street, Brooklyn.

Q. 2. What is your occupation?

A. Electrician.

Q. 3. For what concern?

A. National Enameling & Stamping Company.

Q. 4. At what factory of theirs?

A. Berlin, Laurel Hill.

Q. 5. And how long have you been electrician at their factory at Berlin?

A. Since 1903, except fourteen months interval in 1904 and 1905.

Q. 6. Except for that interval you have been working continuously as electrician at this factory ever since the date you name?

A. Yes.

Q. 7. Do you recall the receipt at the factory of fifteen spot welding machines from the Baltimore factory?

A. Yes, sir.

Q. 8. From your general recollection, about how long ago was that?

A. Twelve years ago,— 1907.

Q. 9. Have you any way by which you can fix the date absolutely?

A. Nothing but the record of the time I have kept on the job.

Q. 10. What record is that?

A. The record of the work and time I have been working; the time I put in.

Q. 11. Will you produce that record?

A. [*Witness produces book.*]

Q. 12. Will you please state just what this book is?

A. It is a record of the time the men put in on the job for setting up the generators to operate the machines.

Q. 13. You mean for these fifteen spot welding machines?

A. Yes, for these fifteen spot welding machines.

Q. 14. Whose book was it?

A. It was a throw-away book. I claimed it for my own after I picked it up from a lot of scraps.

Q. 15. Will you please point out the entries you refer to in this book?

A. The entries for the amount of time for installing the cables to carry the current to operate the machines.

Q. 16. Is this the page you have referred to?

A. All through here [*witness referring to the first few pages*].

Q. 17. In whose handwriting are the entries on these first few pages?

A. My own.

Q. 18. And were made by you?

A. And were made by me.

Q. 19. When were they made?

A. At the time the job was being put through.

Q. 20. Are there any dates on these pages?

A. They are all dated.

Q. 21. What are those dates?

A. Starting May 18, 1907, into June, end of July and into August.

Q. 22. The last date was what?

A. August 5th.

Q. 23. The heading of this is: "G. E. Co. A. C. Gen." What does that refer to?

A. That refers to the generator we used for producing the current to operate the spot welders with,— the only machine we have of its kind.

Q. 24. What did you have to do with these fifteen spot welding machines?

A. Just set them up and got them in proper operation.

Q. 25. You had charge of that work, did you?

A. Yes, I did.

Q. 26. Do I understand that the various men mentioned on these pages worked under you on that work?

A. Yes, worked under me on that work.

Q. 27. How long did it take to set up those fifteen spot welding machines?

A. That I couldn't say; that is, before we started to operate any of them; I couldn't say what date that started in. We started in different parts of the factory.

Q. 28. Well, you can tell when the last work was done setting up those machines, can't you,—the date of the last work,—from this book?

A. Well, we ceased operations in putting up,—yes, that book would probably cover it. We were operating before the end of that work.

Q. 29. You mean that some machines had been fully installed and were operating before August, 1907?

A. Yes, sir.

Q. 30. But the last of them were set up by August, 1907?

A. Yes.

Q. 31. What was done with these fifteen spot welding machines after they were set up?

A. Manufacturing the goods.

Q. 32. You mean fastening joints on to ware by spot welding?

A. Putting the trimmings on by spot welding.

Q. 33. From the entries in these books, can you state positively that it was at least by May, 1907, that those fifteen spot welding machines were at the factory here at Berlin?

A. Yes, at the factory here at Berlin.

Q. 34. Was it any part of your business to operate any of these spot welding machines?

A. No, sir.

Direct examination closed.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 35. There is no entry in this book of yours that refers in terms to spot welding machines, is there?

A. Not directly; no, I don't believe there is.

×-*Q.* 36. And you had nothing to do with the operation of those machines?

A. No more than to see they were in proper working order for

operating in the production line, — just in testing out and inspections.

×-*Q.* 37. Were all these machines put up in one room.

A. No, sir.

×-*Q.* 38. Where were they placed?

A. In three or four different places.

×-*Q.* 39. Were all these machines alike?

A. They were all alike, except there were two rotaries and thirteen straight action machines. We called them rotary; it is only a side sweep, side offset, on two of them.

×-*Q.* 40. I would like to have you describe a little more particularly the difference between those two sorts of machines.

A. The thirteen made contact in a straight perpendicular manner. The others set off more in this way — one was a straight perpendicular action; one was a lateral action, — two of them.

×-*Q.* 41. Were these machines where anybody coming into the factory could see them in operation?

A. I should say they were; yes.

×-*Q.* 42. No special injunction of secrecy about their use?

A. No, not that I know of.

Cross-examination closed.

Mr. Kenyon. Plaintiff's counsel offers in evidence the book referred to by the witness, and it is marked "Plaintiff's Exhibit No. 17, Heron Memorandum Book".

Deposition closed.

Deposition of Sol Richman.

Sol Richman, a witness called on behalf of plaintiff, having been duly sworn, testifies as follows: —

Direct Examination.

By Mr. Kenyon.

Q. 1. What is your name, age, and residence?

A. Sol Richman; reside at 35 Greenwood Avenue, Far Rockaway, Long Island; fifty-two years old.

Q. 2. And your occupation?

A. Factory manager.

Q. 3. Of what factory?

A. Laurel Hill factory, New York branch, National Enameling & Stamping Company.

Q. 4. How long have you been manager of that factory?

A. For twenty years for the National Enameling & Stamping Company; and prior to that factory manager for the Haberman Manufacturing Company.

Q. 5. And all the time at this same factory?

A. Yes, sir.

Q. 6. Where is the factory located?

A. Laurel Hill, Long Island.

Q. 7. Did it ever have a different name?

A. This town is termed Berlin Village, and we called the factory the Berlin factory of the National Enameling & Stamping Company.

Q. 8. That was the old name, I understand?

A. Yes, sir.

Q. 9. Are you familiar with spot welding machines?

A. Yes, sir.

Q. 10. Do you use them at your factory?

A. Yes, sir.

Q. 11. How long have you used them?

A. To the best of my recollection, since 1907.

Q. 12. Have you any way of fixing that date?

A. Only that I ordered fifteen machines from Mr. Knapp, who went to Europe; I ordered fifteen machines of Mr. Knapp in 1906, but I have no copy of the records; all our records have been destroyed, and according to our books they came in in April or May, 1907.

Q. 13. And does that agree with your general recollection as to the length of the time since these machines were received?

A. Yes, sir.

Q. 14. Who supplied these machines to your factory?

A. National Enameling & Stamping Company, Baltimore branch.

Q. 15. Do you recall the first shipment of those machines?

A. The fifteen all came in one car.

Q. 16. What was done with these machines?

A. When they arrived at the plant, I ordered them to be put in the engine room until such time as we were ready with the installation for operation.

Q. 17. When were they installed, as near as you can recollect?

A. During the month of May or June, in 1907.

Q. 18. Who did this work?

A. Our electrician, Heron.

Q. 19. How soon is it your recollection that one or more of these machines were put at work in the regular way of production in your factory after your receipt?

A. I should judge that we did electric welding in the month of June or July, 1907.

Q. 20. So it was at least within several months after the receipt of the machines?

Mr. CHURCH. Objected to as leading.

A. One or two months after they were received; but they were not all put in operation at one time.

Q. 21. How soon would you say that all these machines had been put into operation?

A. I should judge by the end of the year 1907 they were all pretty well under way.

Q. 22. How extensively have these machines and others like them been used for spot welding in your factory since then?

A. I suppose we have thirty or thirty-five working at the present time.

Q. 23. They have been used continuously right along since 1907?

A. Pretty much; whenever we have work.

Q. 24. What class of work do you do on spot welding machines?

A. A general line of cooking utensils, such as dishpans, saucepans, coffee pots.

Q. 25. And what part of the work on those dishpans, saucepans, etc.?

A. Affixing the various handles, lips or spouts.

Q. 26. Before you received these fifteen machines, how were those spouts and handles put on to the ware?

A. By means of rivetting.

Q. 27. How is it today in your factory; do you put such spouts and lugs on the goods by spot welding, by rivetting, or by both?

A. Both; but the majority is being done by electric welding,—spot welding. Of course, very heavy work we do with rivets.

Q. 28. What kind of work do you use rivets with? What metal?

A. When it comes to 16 or 18 gauge materials and very heavy handles such as used for hotel ware, our machines are not heavy enough to carry the current through those heavy materials.

Q. 29. What metal is that ware made of?

A. To what do you refer?

Q. 30. This heavy metal.

A. From 18 to 14 gauge.

Q. 31. What kind of metal?

A. Sheet steel, and the handles are made from wrought iron, say one-quarter to three-eighths inches in diameter.

Q. 32. Do you use the rivetting with lighter work at all?

A. On tinware.

Q. 33. On tinware only?

A. That's all.

Q. 34. All the rest is done by spot welding?

A. All the ware for enameling is spot welded.

Q. 35. How does spot welding compare with rivetting in the class of work that you use spot welding for in your factory,—that is to say, lighter work?

A. As to quality?

Q. 36. In every way, cost, merit and excellence of the goods. In other words, how do these two methods compare with one another in practical use?

A. In my judgment, welding is from 100 to 150 per cent faster than rivetting; and, as to quality, welding is far superior to rivetting, especially in the enameling process. We have no rivet heads to contend with when we spot weld. In former years, when we used rivets, when we fired the article the rivets became loose and the enamel got between the article and the handles. By spot welding we don't have any such troubles. It makes the two metals homogeneous, whereas the other way, when you put an article into the fire for scaling, the handles become loose, because the material deteriorates and scale forms and it becomes loose, and we get considerably more seconds with an article that is rivetted than we do by spot welding; and an article that is spot welded is perfectly smooth on the inside, whereas when we use rivets the enamel shows the head of the rivets on the inside and the enamel is very apt to

chip off by the constant use of the handle, and naturally the rivets will work loose.

Q. 37. How do spot welding and rivetting compare with each other in cost?

A. I should think you can do two to one spot welding against rivetting. Of course, in some articles, the heavier articles, there may be only 100 per cent,— it depends on the nature of the work, —but in general I think it is 100 per cent.

Q. 38. How about wages of rivetters as compared with wages of workmen on spot welding machines?

A. You refer to the present time, or former times?

Q. 39. In the present time and ten years or so ago.

A. Those days are gone by. When we first installed these machines I suppose we got boys and girls for $5 and $6 a week, where we paid rivetters $12 a week; but today the same boys on these machines get $18 to $20 a week and rivetters from $30 to $40 a week, and they are not satisfactory.

Direct examination closed.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 40. During all this period that your company has been using spot welders, what efforts have been made to stop their use by patent suits?

A. None whatever.

×-*Q.* 41. Don't you know that a suit was brought by the Thomson Electric Welding Company and the Universal Electric Welding Company against your company for infringement?

Mr. KENYON. Objected to as not proper cross-examination.

A. I never was informed of any suit.

×-*Q.* 42. Never heard of it?

A. No; I was never informed to stop.

×-*Q.* 43. But you were informed of the fact that a suit had been brought, were you not?

A. I was never informed that our company was sued for infringement.

Cross-examination closed.

Deposition closed.

Signatures and certificate waived.

District Court of the United States, Eastern District of Michigan, Southern Division. In Equity.

THOMSON SPOT WELDER COMPANY
v.
FORD MOTOR COMPANY.

BOSTON, MASS., May 6, 1919, 10 A. M., 84 State Street.

Met pursuant to agreement of counsel.

Present: J. L. STACKPOLE, Esq., of Counsel for Plaintiff;
MELVILLE CHURCH, Esq., of Counsel for Defendant.

Deposition of Robert W. Clark.

ROBERT W. CLARK, a witness called by and on behalf of plaintiff, having been duly sworn, deposes and says: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation.

A. Name, Robert W. Clark; residence, 69 Whiting Street, Lynn, Mass.; age, forty-nine years; occupation, employed by the Thomson Electric Welding Company.

Q. 2. In what capacity are you employed by the Thomson Company?

A. At the present time as foreman and demonstrator.

Q. 3. When were you first employed by the Thomson Electric Welding Company?

A. In the winter of 1891 or 1892.

Q. 4. In what capacity?

A. At that time I was stock keeper and shipping clerk.

Q. 5. Have you been employed by the Thomson Company ever since?

A. With the exception of two years. From 1894 to '95 I was operating one of their welding machines for another company.

Q. 6. What have been your positions with the Thomson Company from the beginning of your employment?

A. From 1891 to 1893 I was stock keeper and shipping clerk; 1894 I was operating a welder in the factory; from 1894 to 1895 I was away from the company; from 1896 to 1907 I was operator on electric welders at the factory; from 1907 to about the present

time I have been foreman, and the last year or so demonstrator and so-called service man.

Q. 7. During the years that you were with the Thomson Company, were you employed at their factory in Lynn, Mass.?

A. Yes, sir.

Q. 8. Did they have any other factory but that one?

A. That is the only one.

Q. 9. Were you familiar with the types of electric welding machines made by the Thomson Company during your employment?

A. Yes, sir.

Q. 10. Do you know Adolph F. Rietzel?

A. Yes, sir, I do.

Q. 11. How long have you known him?

A. Ever since the first period of my being employed by the company.

Q. 12. Was he employed by the Thomson Company at that time when you entered their employ?

A. He was.

Q. 13. In what capacity?

A. He was foreman at that time.

Q. 14. Mr. Rietzel has been called as a witness for the defendant in this case. Have you read his deposition?

A. I have.

Q. 15. Mr. Rietzel in his deposition states that in the year 1898 at the factory of the Thomson Company in Lynn, Mass., he electrically welded together the ends of hub bands for wagon wheels by lapping the ends of the hub bands and then electrically welding the overlapped ends. He also states that he thinks that he showed you his work on these bands. State what you recall concerning this matter.

A. I do not remember anything about it.

Q. 16. Do you recall the electric welding of the ends of hub bands by Mr. Rietzel in or about the year 1898?

A. Yes, the butt welding of bands about that time.

Q. 17. Do you recall his welding hub bands by overlapping their ends?

A. No.

Q. 18. Mr. Rietzel in his deposition speaks of using an electrode

with a hole in its end for this purpose. Do you recall the use of such an electrode?

A. I do.

Q. 19. What was it used for?

A. I used that for welding a sewing machine part.

Q. 20. What kind of a sewing machine part?

A. It was a small metal plate having an arm extended from one end and a small disc or washer with a pin through the centre and was welded to the other end of the plate; the hole in the electrode was made to take the centre pin so that the two could be welded together.

Q. 21. Do you recall any use by Mr. Rietzel of this electrode for welding overlapped ends of hub bands?

A. I do not.

Q. 22. Mr. Rietzel has also testified that he did some electric welding on pieces of plough shares later in the same year 1898; do you recall any work along those lines?

A. I do not.

Q. 23. Do you recall doing any work yourself on such pieces of plough shares in or about that time?

A. I have a recollection of someone bringing in several pieces on which they asked me to weld the several pieces together. I tried this out by using two copper dies which covered the entire ends of the pieces to be welded; in fact, I didn't obtain any welds at all, but these might pertain to plough shares.

Q. 24. When you say that the copper blocks covered the ends of the pieces, what do you mean exactly?

A. The pieces as I recall them were narrow strips, possibly four or five inches long and I should judge one and one-half inches wide. His idea was to weld the ends together for about an inch I should judge.

Q. 25. Did you know Mr. Charles Osgood?

A. I did.

Q. 26. Is he alive now?

A. He is not; he died some three months ago.

Q. 27. Was he employed by the Thomson Electric Welding Company at Lynn?

A. He was.

Q. 28. What was his condition so far as his mental faculties were concerned previous to his death?

A. For the past three years he was in very poor health, had one or two slight apoplexy strokes and his mental faculties were poor, especially his memory. He was employed only in a minor position.

Q. 29. It appears that in or about the year 1888, Prof. Elihu Thomson invented a method of electric rivetting and took out a patent therefor in 1889, No. 396,015, drawings of which I show you. When you entered the employ of the Thomson Electric Welding Company, was that company making machines for such electric rivetting?

A. No, sir; not that I know of.

Q. 30. During the next twenty years did the Thomson Company make any such machines for electric rivetting?

A. No, sir.

Q. 31. Except for the two years that you were away from the plant at Lynn, would you have known of such machines had the Thomson Company made them?

A. I should.

Q. 32. In or about 1890, Prof. Elihu Thomson appears to have invented a method of electric welding for welding the overlapped edges of two sheets of metal between two roller electrodes and on January 20, 1891, took out patent No. 444,928, a copy of which I show you. At the time you entered the employ of the Thomson Company was that company making machines for such roller welding?

A. No, sir.

Q. 33. During the next twenty years was the Thomson Company making such machines?

A. Not with the two roller electrodes.

Q. 34. What difficulties, if any, are there in the use of such roller electrode welding machines?

A. The difficulty found in what is called lap seam welding has been that the stock is sometimes scaly and the edges are rough, somewhat rusty, and in setting the pieces to be welded the overlapped portion must be very accurate. The speed of the roller passing over the work, the amount of current used and pressure of the roller all combined is very difficult to handle and to get them

properly adjusted. If the pieces are overlapped too much there would be no weld, and if the overlap is too little the joint or metal will burn through and also will burn or pit on to the roller electrode, necessitating constant cleaning off of the roller.

Q. 35. You have referred to the necessity of keeping the work free from scale or rust; what is the effect of such scale or rust?

A. It is impossible to get any kind of weld where the material is rusty.

Q. 36. Have you reference now to electric welding with roller electrodes?

A. Yes, with roller seam welds.

Q. 37. Did the Thomson Company in the first twenty years of your employment make and test a machine with a single roller electrode?

A. It did.

Q. 38. When was that machine made, what use was it put to and what were the results?

A. The years 1906–07 they built one of these machines which was experimented with at the factory and finally shipped to a concern in Connecticut for welding coffee pots. It was kept there several months and finally returned to the factory.

Q. 39. What happened to it after it was returned to the Thomson factory?

A. It is still in existence in the storehouse.

Q. 40. Was it used for electric welding?

A. Not after its return to the factory.

Q. 41. One of the electrodes was a roller; what was the other?

A. What we call a solid horn. In this instance it was a short horn, possibly about ten inches long, from three to four inches in diameter attached with a suitable holding jig to clamp the cylinder to the upper surface.

Q. 42. Did this horn when in use extend into the coffee pot?

A. It did.

Q. 43. Was it in contact with the seam to be welded throughout the entire length of the horn? Please state the arrangement in your own words.

A. The lower copper horn was attached with a sliding contact connected to the transformer of the welder, the coffee pots or cylin-

ders placed on the horn and clamped in position, this carriage or horn then moving on a plane directly beneath the roller electrode. As the roller came in contact with the end of the cylinder the current was turned on and automatically cut off at the opposite ends of the cylinder.

Q. 44. Did you see this machine in operation at the works of the concern in Connecticut to which it was sent?

A. I did.

Q. 45. With what success was it there working?

A. I called there to see what was being done with it, and found that it was not working, due to the troubles which I previously described — making poor welds and the necessity of continually cleaning the copper roller — and they started it up for me and tried several welds showing the results.

Q. 46. In or about the year 1889, Prof. Elihu Thomson appears to have invented a machine for electric soldering and took out a patent, No. 496,019, April 25, 1893, drawings of which I show you. Did the Thomson Company make such machines during your employment with them?

A. They did not.

Q. 47. In or about the year 1891 Hermann Lemp appears to have invented an apparatus for electric welding, shown in patent No. 553,923, February 4, 1896. In that patent Mr. Lemp speaks of an alleged old process of welding shown in Figs. 1 and 2 in which two pairs of roller electrodes are employed. Did the Thomson Company ever build machines to carry out such process while you were employed there?

A. They did not.

Q. 48. Have you ever seen such machines?

A. Nothing of the kind.

Q. 49. Have you ever seen electric welding machines for welding strips in which there were as many as three pairs of contacts as shown in Figs. 3, 4 and 5 of this Lemp patent?

A. I have not.

Q. 50. Are you familiar with spot welding using a pointed electrode?

A. Yes, sir.

Q. 51. Does such a method result in a strong weld?

A. It does.

Q. 52. How does the strength of a weld compare with that of a rivet?

A. About the same.

Q. 53. Is spot welding cheaper than rivetting?

A. A great deal cheaper.

Q. 54. What are the reasons for that?

A. Speed is one thing, as it can be done so much faster, requiring no punching of holes.

Q. 55. Can spot welds be made by the pointed electrode method on work which is not absolutely clean?

A. It can. If the stock is scaly or rusty, the current is left on for a longer period, which can be controlled by the operator in giving it time to burn through the scale or rust.

Q. 56. Have you prepared a specimen of work that can be done by spot welding, using the pointed electrode method?

A. I can.

Q. 57. Does this article show a number of spot welds?

A. Yes, several different kinds of work which can be spot welded.

Q. 58. Were the spot welds made by you personally?

A. They were.

Q. 59. Please explain the peculiarities of some of these spot welds.

A. We have one with about a dozen thin pieces all spot welded together in one operation. Another showing a brace of heavy material welded to the corner section of a case or box. Another of what we call an angle iron welded in a corner of a case, this being a thin section welded to a heavier section. Another with a pipe having a collar or ring welded to the circumference of the pipe. Another which could be described as a cup setting inside of another, both being spot welded together, also a rectangular heavy section welded to a thin section. Still another of a rectangular heavy section having a thin section welded one on each side. The two samples of pipes were welded where neither one could move relatively to the other.

(Plaintiff's counsel offers in evidence an exhibit and the same is marked "Plaintiff's Exhibit No. 18, Specimen of Spot Welds Prepared by Clark".)

Q. 60. In general to what work is electrode spot welding adapted?

A. To plates or pieces of material that can be welded at any point in contact and at any position desired.

Q. 61. Is any preparation of the work necessary for electrode spot welding?

A. There is no preparation needed.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 62. Mr. Clark, was precisely the same amount of current employed in making each of the spot welds on the exhibit you have produced, or was it varied according to the article operated upon?

A. It was varied.

×-*Q.* 63. Explain that a little further, especially as to the several pieces of thin section to be welded requiring a greater amount of current to make them weld.

A. The pipe section being two pieces of about equal sections requires more current than where a heavy section is welded to a thin section.

×-*Q.* 64. And where two thin sections are required to be welded is the current more or less?

A. Less.

×-*Q.* 65. So that you have to vary the current according to the thickness of the pieces to be welded; is that a fact? How long has that been known to you and the necessity for doing that?

A. Ever since I have done spot welding, possibly six or seven years.

×-*Q.* 66. You didn't know anything about spot welding before six or seven years ago?

A. I knew of it, but I practiced it very little.

×-*Q.* 67. Where did you get your first impression in regard to spot welding, — I mean what you call electrode welding?

A. At the factory in Lynn.

×-*Q.* 68. Was a spot welding machine set up there at Lynn?

A. It was.

×-*Q.* 69. Who set it up?

A. I think I did myself.

×-*Q.* 70. Describe what you set up first in the way of a spot welding machine.

A. It was a vertical machine of similar design of any welding machines, except in vertical position it used two pointed electrodes set in the upper and lower horns as we call them, and operated by hand pressure.

×-*Q.* 71. What did you weld?

A. They were called biscuit pans for some company here in Boston.

×-*Q.* 72. Do you mean the corners of biscuit pans?

A. Joining the biscuit pans together by small rectangular pieces of steel holding three pans together.

×-*Q.* 73. How thick were the parts welded together?

A. The pan I should judge was one-sixty-fourth inch, the side pieces about one-sixteenth inch.

×-*Q.* 74. For what concern was this machine made?

A. The A. F. Ward Baking Company of Boston.

×-*Q.* 75. Who designed this machine?

A. I think the Thomson Electric Welding Company.

×-*Q.* 76. You didn't design it, did you?

A. No, sir.

×-*Q.* 77. Nor did Mr. Rietzel design it?

A. I couldn't say.

×-*Q.* 78. How long ago was this that the machine was made for the Ward Company?

A. The machine was not made for the Ward Company; the work was done for the Ward Company.

×-*Q.* 79. What was the date?

A. The machine was built, I believe, as early as 1907 or 1908; but it was not used for spot welding; that is, I didn't use it for spot welding until about the year 1912.

× *Q.* 80. It was used for spot welding before you used it, was it not?

A. Not in our factory.

×-*Q.* 81. Was it used anywhere?

A. I don't think it was.

×-*Q.* 82. Are we to understand that while you were using the Ward machine you learned this necessity for varying the current to adapt the method to the joining of parts of different thickness?

A. Yes, sir.

X-*Q*. 83. Your previous experiments in electric welding taught you that, didn't it?

A. Yes, sir.

X-*Q*. 84. Of what extreme thinness can articles be spot welded together?

A. Thirty gauge has been spot welded. I couldn't say the thickness in fractions of an inch.

X-*Q*. 85. How thick may the materials be that may be spot welded?

A. Personally I have only been able to weld two plates or sheets of one-quarter inch each in thickness.

X-*Q*. 86. But you think they may be varied if you have a competent machine and enough current?

A. They have been experimented with one-half inch plates without any great results.

X-*Q*. 87. You don't know who got up the design for the first spot welding machine that was constructed or used at the Lynn factory, do you, for the Thomson Electric Welding Company?

A. I do not; it was in Mr. Rietzel's time.

X-*Q*. 88. And it may have been him?

A. Possibly.

X-*Q*. 89. When Mr. Rietzel left the Thomson Electric Welding Company he went to the Universal Electric Welding Company, did he not?

A. Yes.

X-*Q*. 90. That was some time in 1907, was it not?

A. I think about that year.

X-*Q*. 91. Was Mr. Rietzel a skillful man as an electric welder?

A. Yes; he was continually experimenting.

X-*Q*. 92. He was the foreman of the Thomson Electric Welding Company, or the manager of that company, before he left, was he not?

A. Yes; I should say superintendent and acting manager.

X-*Q*. 93. And occupied quite a responsible position there?

A. Yes.

X-*Q*. 94. Was regarded as a good man?

A. Yes.

X-*Q*. 95. How recently have you seen Mr. Adolph F. Rietzel?

A. I met him at the factory I think in January of this year.

×-*Q.* 96. You mean at your factory?

A. Yes.

×-*Q* 97. What was he doing there?

A. I don't know what his business was.

×-*Q.* 98. Is he employed there now?

A. No, sir; I think not.

×-*Q.* 99. How recently has he done work for the Thomson Company?

A. I couldn't say.

×-*Q.* 100. Give your best judgment.

A. The last that I know of he was in Philadelphia with me.

×-*Q.* 101. When was that?

A. That was in May of last year.

×-*Q.* 102. What was he doing there for the Thomson Company?

A. He was trying to help us out in getting welders started on ammunition work.

×-*Q.* 103. Was he there in behalf of the Thomson Electric Welder Company or the Thomson Spot Welder Company?

A. The Thomson Electric Welding Company.

×-*Q.* 104. As I understand it, they are distinct concerns?

A. Yes, sir.

×-*Q.* 105. Does the Thomson Electric Welding Company make spot welders for the Thomson Spot Welder Company?

A. Yes.

×-*Q.* 106. How long have they been doing that?

A. I should say two years.

×-*Q.* 107. In fact all the machinery spot welders being used by the Thomson Spot Welder Company are made for that company by the Thomson Electric Welding Company, are they not, so far as you know?

A. I couldn't say just how the two are combined.

×-*Q.* 108. But you know that their relations are very close?

A. Yes. The Thomson Spot Welder Company is probably located in Cincinnati; their line of spot welders are universally used. Only the main office of the Spot Welder Company is at Lynn.

×-*Q* 109. But still the Thomson Electric Welding Company of

Lynn does build some spot welders for the Thomson Spot Welder Company; is that a fact?

A. I should say not. Not the regular line of spot welders.

X-*Q.* 110. The irregular line, then?

A. Yes, they do some work for them.

X-*Q.* 111. Any kind of spot welding, I mean electrode welding, whether upon thick or thin plates or of thick and thin plates, is best accomplished where the surfaces to be welded are clean, is it not?

A. It can be done quicker that way.

X-*Q.* 112. All other things considered, it is best to have the surface clean, is it not?

A. Yes, sir.

X-*Q.* 113. And that can be accomplished by rubbing or by pickling or by other methods, can it not?

A. It can be.

X-*Q.* 114. You do not desire to leave upon the mind of the court the impression that lap welding of clean metal plates may not be accomplished by the used of one or more roller electrodes, do you?

A. It can be done.

X-*Q.* 115. Have you seen it done?

A. One roller electrode, not using two.

X-*Q.* 116. You mean to leave upon the mind of the court the impression that lap welding involving the production of a continuous seam may not be effected between two overlapped plates by the employment of two co-operating roller electrodes?

A. It may be possible to do it.

X-*Q.* 117. You say that it is impossible to do it?

A. It may be possible.

X-*Q.* 118. Do you consider yourself up-to-date in the matter of electric welding?

A. Yes.

X-*Q.* 119. Do you not know that it is a common practice to employ roller electrodes in electric seam welding?

A. It is, but it is limited to certain conditions.

X-*Q.* 120. What are those conditions?

A. The material thickness and condition of the material.

×-*Q.* 121. You mean to say that the application of roller electrodes is not so universal as the application of pointed electrodes?

A. Yes, sir.

×-*Q.* 122. For many years the Thomson Electric Welding Company was in control of the electric welding industry,— I mean by that resistance, welding under the Thomson patents,— was it not?

A. I am not familiar with any of the patent situations at all.

×-*Q.* 123. But there were many years in which the Thomson Company really had no competitors in electric welding; that is true, is it not?

A. Yes, sir.

×-*Q.* 124. Have you ever known of the successful commercial use of an electric welding machine employing two roller electrodes?

A. No, sir.

Signature and certificate waived by consent of counsel.

Adjourned until further notice.

BOSTON, MASS., May 8, 1919, at 2 P. M., 84 State Street.

Met pursuant to agreement of counsel.

Present: J. L. STACKPOLE, Esq., for Plaintiff;
ROBERT CUSHMAN, Esq., for Defendant.

Deposition of Hermann Lemp.

HERMANN LEMP, a witness called by and on behalf of plaintiff, having been duly sworn, deposes and says: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation.

A. Hermann Lemp; fifty-six years; works engineer for the General Electric Company, Erie works, Erie, Pennsylvania.

Q. 2. Are you employed by the Thomson Electric Welding Company, or the Thomson Spot Welder Company?

A. No, not since 1896.

Q. 3. Are you the Hermann Lemp, patentee of patent No. 553,923?

A. Yes.

Q. 4. Have you recently read that patent?

A. I have.

Q. 5. Referring now to Figs. 1 and 2 of that patent, which according to the specification illustrates an apparatus that might be used for welding in a manner employed previous to your invention, please state what method previously employed is therein referred to and illustrated in these Figures Nos. 1 and 2.

A. The apparatus illustrated in Fig. 1 may be used for two different methods, the one illustrated in a previous patent by Professor Elihu Thomson for continuously lap welding sheets of steel or iron, and the other one employed by me for the same purpose or for welding strips of metal together, the difference between the two methods being that in the first the current is passed transversely, while in the latter the sheets to be welded are heated by currents passing longitudinally through the parts to be welded together, and being finally united by pressure, but without necessarily a current passing through the joint.

Q. 6. In those previous methods what was the relation of the electrodes to the overlapped sheets?

A. In both of these methods the electrodes would either entirely overlap the strips to be welded or completely overlap one side. These have particular reference to lap welded joints where the edges are covered by the electrodes proper.

Q. 7. When the methods were applied to welding strips, what was the relation of the electrodes to the strips?

A. The electrodes would completely cover the whole width of the strip or exceed it,— overlap it on either side.

Q. 8. In those old methods please state whether the parts welded together were welded over their entire contacting area.

A. Yes, they were.

Q. 9. State whether that is true of not only the old methods referred to but to the methods embodying your invention and set forth in that patent.

(Objected to by Mr. Cushman that the patent is the best and only evidence of what is set forth in it.)

A. Yes, it covers both the old and the new.

Q. 10. How do you reconcile these facts with the showing of Fig. 2 of your patent?

A. The only way I can explain this discrepancy is an error of the draftsman at the time this illustration was made.

Q. 11. Has the method of your patent No. 553,923 gone into practical use?

A. No, it never went by the experimental stage.

Cross Examination.

By Mr. CUSHMAN.

×-*Q.* 12. Is there any doubt in your mind that roller welding of the character shown in your patent No. 553,923 is practicable?

A. As I remember, the experiments that were made at the time I considered it feasible, but there was not demand enough at the time to call for it.

Signature and certificate waived by consent of counsel.

Plaintiff's counsel offers in evidence a copy of the patent to DeFerranti, No. 906,400; the same is marked "Plaintiff's Exhibit No. 19, DeFerranti Patent No. 906,400".

DETROIT, MICH., May 19, 1919.

Testimony taken before Hon. John M. Killits.

JAMES H. GRAVELL, after being duly sworn on behalf of the plaintiff, testified as follows: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. You have already testified in this case?

A. Yes, sir.

Q. 2. Will you produce a few samples of commercial electrical spot welding, and show the court the spot welds on the articles; say what they are and where they are spot welded?

A. This sample which I hold in my hand was secured from one of the local Detroit concerns. It consists of a waste basket, the basket is made of a number of sheet panels with corner pieces, and the sheet panels are attached together by a number of spot welds. By slanting the eyesight on them, the positions of these spot welds are very evident.

(Plaintiff's counsel offers the spot welded waste paper basket in evidence as "Plaintiff's Exhibit No. 20, Spot Welded Waste Paper Basket".)

Q. 3. Have you another example of commercial spot welding?

A. Yes; this sample which I now hold was secured from one of the local Detroit concerns and consists of a fisherman's outfit or basket; the whole article is made of sheet steel and the electric welding is made noticeable on the inner tray. I am told this is of advantage over the wood, because of the wetness which accompanies the business of fishing which warps the wood out of shape. Those are partitions [*indicating*] in one of the members, and all these partitions are planned to make the sheets overlap and connected together with spot welds. These are painted, but by slanting the light on the article you can see the spot welds.

Mr. Fish. Will you show one of the rivets on the corner, the brass rivets?

A. The fittings in this case are made of brass, and in some cases the brass does not come in facial contact with the metal of the case, and in those places the parts are connected by brass rivets.

Mr. Fish. Just to show a rivet, that is all, your Honor.

Mr. Stackpole. We offer this in evidence as "Complainant's Exhibit No. 21, Spot Welding Fisherman's Box".

Q. 4. Have you another sample of electric spot welding?

A. The sample I now hold was not secured by me, but it can be easily recognized as a chimney used on car heating systems, and I believe in this city it is used on the street cars, as I think I have noticed these chimneys on the Detroit cars. These chimneys are stamped metal parts which are united by spot welds. This sample is also painted, but the evidence of the spot welds is indicated by slanting the light on the sample.

Mr. Stackpole. I offer this in evidence as "Plaintiff's Exhibit No. 22, Spot Welded Stove Pipe Top".

Q. 5. And have you another sample of commercial spot welding?

A. This sample was also secured by me in one of the local Detroit stores. It consists of a small saucepan, the handle of which has been electrically welded. The article has been enamelled and it is very difficult to detect exactly where the spot welds are. The little blemishes on the handle are due to imperfections in the enamelling, as by looking through the handle you can see it is not a rivet, but spot welded; you can see it in the centre of the handle.

Mr. STACKPOLE. I offer that as "Plaintiff's Exhibit No. 23, Spot Welded Saucepan".

Q. 6. I show you another example of spot welding. What does that appear to be?

A. From the name stamped on the small piece it is evident this is the outer casing of a Ford radiator or apron placed in the top of a metal frame, and are secured thereto by a number of spot welds. These spot welds, owing to the enamelling of the article, are practically invisible on the outer side of the radiator case, but are plainly visible from the inside.

Mr. STACKPOLE. I offer that in evidence as "Plaintiff's Exhibit No. 24, Outer Casing of Ford Radiator".

Q. 7. Have you just been up to the shop of the Steel Products Company with the court and counsel, and did you there exhibit a butt welding machine and a spot welding machine?

A. Yes, sir.

Q. 8. Is this the specimen of the butt welding that you made on the machine in the presence of the court and counsel?

A. This is the sample I made.

Mr. STACKPOLE. I offer that in evidence as "Plaintiff's Exhibit No. 25, Sample of Butt Welding".

Q. 9. And are these the samples of spot welding that you did?

A. Yes, these are the samples of spot welding I did.

Q. 10. How thick is the metal of the larger sample?

A. I will have to estimate this; I have no measuring instruments with me, but it is between one-thirty-second and one-sixteenth of an inch thick. Both sheets are of the same quality of steel and both sheets are of the same thickness.

Mr. STACKPOLE. The large sample is offered in evidence as "Plaintiff's Exhibit 26, Large Sample of Spot Welding".

Q. 11. Is this a smaller sample of spot welding?

A. Yes, sir; this sample consists of sheets approximately .014 of an inch in thickness. I did this this morning.

Mr. STACKPOLE. I offer in evidence this as "Plaintiff's Exhibit No. 27, Small Sample of Spot Welding".

Q. 12. I notice on this large sample the spot welds, some of them, are rough; what is the cause of that?

A. This particular machine has a number of adjustments or positions for welding, and as this was my first experience on the machine, it requires a little experience to adjust the machine properly for any special line of work. The weld made was simply to show the general idea of spot welding, and no effort was made to produce what might be called good looking spot welds. In some cases the current was a little too strong for the size of the sheets, but as probably you noticed this morning, I adjusted the machine to give the proper result.

Q. 13. When you spoke of seeing the spot welding machines used at the Ford plant were they standard commercial welding machines?

A. Yes, sir.

Q. 14. Of the ordinary kind?

A. Of the ordinary kind.

No cross-examination.

Mr. STACKPOLE. That closes what *prima facie* evidence we wish to offer at this time.

Testimony in Rebuttal.

BOSTON, MASS., June 16, 1919, 11 o'clock A. M.

Met pursuant to agreement of counsel.

Present: J. L. STACKPOLE, Esq., Counsel for Plaintiff;
MELVILLE CHURCH, Esq., Counsel for Defendant.

Depositions taken under the statutes of the United States and Equity Rules on behalf of the plaintiff in the above-entitled case before me,

HECTOR M. HOLMES,
Notary Public.

Deposition of L. Curtis Brewer.

L. CURTIS BREWER, having been duly sworn, deposes and says as follows: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation.

A. Lawrence Curtis Brewer; age, forty-two; I live at St. Paul, Minnesota; I am a boss carpenter, construction work.

Q. 2. You are in business for yourself?

A. No, not at present.

Q. 3. Have you any connections with the Thomson Spot Welder Company?

A. I have not.

Q. 4. With the Ford Company?

A. I have not.

Q. 5. Were you ever employed by the Warren Electric and Specialty Company of Warren, Ohio?

A. I was.

Q. 6. While you were employed by that company, which I will call the "Warren Company", were you employed as a worker on electric fans?

A. Yes, sir.

Q. 7. What part of the elecric fan did you work on?

A. The guards,— fan guards.

Q. 8. Did those fan guards include rings?

A. Yes, sir.

Q. 9. Of what material were those rings made?

A. Iron.

Q. 10. How were the ends of those rings secured together?

A. They were soldered in a sleeve, then they were brazed and then they were welded,— butt welded.

Q. 11. Do you recall the device or machine by which they were welded?

A. Yes, sir, I remember the machine.

Q. 12. On whose bench was this machine placed in the factory?

A. On the bench that I worked on.

Q. 13. Did you work on this machine?

A. I did.

Q. 14. What did you do with this welding machine?

A. I butt welded the rings for the fan guards.

Q. 15. Who was the first operator to work on this machine after it was set in place?

A. I was the first regular operator.

Q. 16. For how many years did you operate that machine?

A. About four years.

Q. 17. What other regular operators were there on that machine?

A. None while I was there in the employment of that company.

Q. 18. You say that you made the fan guards. How did you make the fan guards, what material did you use and what did you do to it?

A. We received the iron as I remember it in straight lengths. I formed the rings from those lengths of iron in a forming machine. The spokes came in lengths. I also formed the spokes, put the fan guards together, welded it, welded the rings and built the guard complete.

Q. 19. Did you do all this work on one bench?

A. Yes, sir.

Q. 20. Will you make a sketch of your bench on which you did this work, showing the position of the several devices employed by you in making the fan guards and explain the sketch?

A. I have made such a sketch.

Q. 21. Please explain your sketch and how you made the fan guards in connection therewith.

A. The first operation was on the heavy rods used in making the large rings, forming the rods in a circle or ring. The next operation was forming of the spokes, which were then strung on the top ring of guard, then welded, butt welded on welding machine. Then the weld was ground by the motor wheel set in emery. Then the fan guard was built up and the hooks were closed, completing the building of the fan guard.

Mr. STACKPOLE. The sketch offered as prepared by the witness is offered in evidence as "Plaintiff's Exhibit No. 31, Brewer's Sketch of his Work Bench".

Q. 22. Will you describe the welding machine or device which you employed to butt weld the ends of the guard rings, making a sketch if that will help you?

A. This machine, as I remember it, was built on a block of fibre, the fibre being from five-eighths to one inch thick, with copper blocks or jaws to hold the ring, rings being welded closed by levers, of which there were four, two clamping the rings, and two levers butting ends of ring together, electric current controlled by foot lever.

Q. 23. Have you made a sketch of the device?

A. I have a sketch here showing something of the device of the thing. I am not much of a free-hand drawer.

Q. 24. You have referred to a piece of fibre under the clamps. How big was the fibre in its area?

A. About eight by ten, as I remember it.

Q. 25. Were there any slits in this piece of fibre?

Mr. CHURCH. Objected to as leading.

Mr. STACKPOLE. You may answer the question.

A. Not while I worked on this machine.

Q. 26. How was this piece of fibre fastened to the bench?

A. Screwed to the bench to my recollection.

Q. 27. Did the clamps extend beyond the edge of the bench?

A. Yes, the length of the handles. Did you mean the clamps that clamped the ring?

Q. 28. Yes.

A. They did not. Not to my knowledge.

Q. 29. To make this matter exactly clear, what parts of the device did extend beyond the edge of the bench?

A. The handles of the machine.

Q. 30. Do you recall the work of putting this electric welding device on your bench?

A. Yes, sir.

Q. 31. State whether or not the bench was cut with a slit for this machine.

Mr. CHURCH. Objected to as leading.

A. It was not.

Q. 32. You have stated that your work was to butt weld the ends of the fan guard rings on this machine. Please describe what you did with the rings and how you made the weld.

A. After the rings were formed the ends were placed into the machine, clamped and welded.

(Plaintiff's counsel offers in evidence the sketch of the machine produced by the witness, the same to be marked "Plaintiff's Exhibit No. 32, Brewer's Sketch of Welding Machine".)

Q. 33. Was Mr. Fred P. McBerty employed by the Warren Electric and Specialty Company at the time you worked on this machine?

A. Yes.

Q. 34. What was his job?

A. Superintendent I think, if I remember it right.

Q. 35. What did he have to do with this electric welding machine?

A. To my knowledge it was built under his instructions.

Q. 36. What did he have to do with operating it, if anything?

A. Nothing.

Q. 37. I show you a photograph which has been put in evidence by the defendant in this case showing a device. Generally speaking, what does this photograph represent?

A. It represents the welding machine.

Q. 38. Is that photograph a true representation of the welding machine in all particulars?

A. To my recollection the machine did not extend out from the bench as this is shown and it is not the bench upon which I worked.

Q. 39. State whether or not this photograph shows the fibre plate on which the machine was mounted.

A. This photograph does not show the fibre plate.

Q. 40. What does the photograph show as the basis of the clamping device?

A. It shows it mounted on angles with a slot between.

Q. 41. When you worked on the machine was the device mounted on angles?

A. It was not.

Q. 42. When you worked on this machine and on this bench making fan guards were you paid by the day or by the piece?

A. I was first paid by the day, then by the piece.

Q. 43. Were the rings soldered before or after they were welded? I mean by that, how were the first rings fastened together for this fan,— were they soldered or were they welded?

A. You mean at the beginning of the making of this fan before the welder came out, — you mean that?

Q. 44. Yes.

A. To my recollection those rings were soldered, and then, if I remember right, they were then brazed and then welded.

Q. 45. Do you recall the central spiders and blades which were assembled in the fans for which you made the guards?

A. Yes, sir.

Q. 46. Of what material were those spiders and blades?

A. The blades were iron and the spiders to my recollection were brass.

Q. 47. Were there any steel or iron spiders?

A. They used steel and iron spiders to my recollection, though the spiders used mostly were brass.

Q. 48. Were the blades which were made of iron or steel bright or dark colored?

Mr. CHURCH. Objected to as leading.

A. They were of a dark color, not polished.

Q. 49. How were the blades and spiders joined together?

A. They were riveted, to my recollection, while I was in the employment of this company.

Q. 50. How were the blades prepared for riveting?

A. We received the blades from an outside firm, if I remember it, the rivet holes being punched. The blades were flat and were formed in the factory, concaved. The spiders were drilled and the blades were riveted to the spiders.

Q. 51. Do you recall any other method of fastening the blades to the spiders than riveting?

A. No, sir.

Q. 52. Do you recall any other welding done on this machine except the butt welding of the ends of fan guard rings which you have already referred to?

A. No, sir.

Q. 53. What was the shape of the spider arms to which the blades were attached? Were they straight or were they otherwise shaped?

A. Well, the spider was twisted in the shape of a wind wheel.

Q. 54. About how many years ago was it that this machine was set up and operated at the Warren Company?

A. In the latter part of 1901 and the first part of 1902, to my recollection; that is as near as I can remember it.

Q. 55. Do you know Mr. William Smith, who is here present?

A. Yes, sir.

Q. 56. Was he employed by the Warren Company at the time this welding machine was set up and operated?

A. Yes, sir.

Q. 57. Did he have anything to do with the setting up and operating of it?

A. Not to my recollection.

Q. 58. Were you ever visited by Mr. Smith and asked concerning your recollection of this machine?

A. Yes, sir.

Q. 59. When?

A. Some time during 1917.

Q. 60. Where?

A. St. Paul, Minnesota.

Q. 61. What was the substance of your conversation with Mr. Smith at that time?

A. Regarding my operating the welding machine. He asked me if I knew there had been any spot welding done on this machine. If I remember it right, I told Mr. Smith that I had not seen any spot welding done on this machine.

Q. 62. Did Mr. Smith show you any photographs or drawings?

A. If I remember it, I think Mr. Smith or some one sent me two photographs.

Q. 63. What did those photographs show?

A. One was a duplicate of this picture of the welder [*referring to photograph mentioned before as exhibit of the defendant*]. The other showed one of the fans complete, showing the blades, guards, in fact, the fan complete showing no rivet heads on the blades.

Q. 64. Do you recall what was the purpose of showing you these photographs?

Mr. CHURCH. Objected to as incompetent.

A. He stated to me that there was some company had a spot welding machine and they claimed to be the first, and that they were claiming McBerty and that outfit to be the first people to do spot welding and wanted a statement from me as to what I knew about the machine.

Q. 65. Did you give him a statement?

A. I don't remember of giving them any written statement. Not any more than a verbal statement, which I told Mr. Smith that I did not remember seeing any spot welding done on this machine.

Q. 66. Did Mr. Smith explain to you what he meant by spot welding?

A. Yes, sir.

Q. 67. What was that?

A. When two pieces of metal were welded in a spot in place of a rivet.

Q. 68. Before Mr. Smith explained this to you, what knowledge had you had of spot welding?

A. None whatever.

Q. 69. Where are the photographs that were sent you either by Mr. McBerty or by Mr. Smith?

A. They are now in St. Paul, Minnesota.

Q. 70. Will you please mark those with your name and with the statement that they were sent to you by Mr. McBerty or by Mr. Smith, as the case may be, and forward them to me with any letters or copies of letters that may have come with them?

A. Yes, sir.

Q. 71. Referring again to the welding device which you used at the Warren Company, were the clamping blocks cut or prepared in any way for holding the rings?

A. They were grooved, something in the shape of the iron ring which they were to receive.

Q. 72. And what was the position of the rings when you welded them? Did they lie in a horizontal plane or in a vertical plane?

A. Horizontally, I believe, as I remember it.

Direct examination closed.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 73. While you were at work in the Warren Electric and Specialty Company it was not your job to connect the fan blades to the spider, was it?

A. No, sir.

×-*Q.* 74. Did no one to your knowledge besides yourself ever use this electric welding machine at the Warren shop?

A. When the machine was first set up Mr. McBerty made a few butt welds showing me how the machine was operated. Other than that I don't remember of anyone else ever working on the machine during my employment with this company.

×-*Q.* 75. But others might have worked on the machine? They might have done work on that machine without your knowledge?

A. They might have done it at night.

×-*Q.* 76. But when you were absent from the machine?

A. I was there most of the time. I stepped out and back because that was my work, and I would have known if anyone else was working on the machine.

×-*Q.* 77. But when you were out to luncheon or dinner or absent from that machine it might have been used by others, might it not?

A. Oh, yes, it might have.

×-*Q.* 78. Would you swear positively that that machine was not used by anybody but yourself?

A. No.

×-*Q.* 79. How long have you been in Boston on this trip?

A. I landed at 6.10 Saturday evening.

×-*Q.* 80. A week ago Saturday?

A. No, this Saturday, the 14th; today is the 16th.

×-*Q.* 81. When did you leave St. Paul?

A. Thursday evening, the 12th.

×-*Q.* 82. And where did you meet your brother?

A. My brother came to my home in St. Paul.

×-*Q.* 83. Who sent him there?

A. Mr. Lyne asked me if I would get a statement from my brother, who lives at Haywood, Wisconsin, and I made a trip to Haywood, Wisconsin, and asked my brother for this statement and he sent it.

×-*Q.* 84. When did Mr. Lyne ask you for this?

A. Mr. Lyne was in St. Paul some time during the first part of May I believe, if I remember it,— along the first part of May.

×-*Q.* 85. And when did you first go to see your brother about this matter?

A. About the 27th or 28th of May.

×-*Q.* 86. Do you know Mr. E. B. Craft?

A. E. B. Craft. I don't think so.

×-*Q.* 87. Didn't Mr. E. B. Craft at one time work with the Warren Electric and Specialty Company? He was quite a young fellow then.

A. I don't remember the man at all. I don't remember the name E. B. Craft.

×-*Q.* 88. You have not been shown recently, have you, that welder that you saw and worked with at the Warren factory?

A. I have never seen it since I worked on it.

×-*Q.* 89. You don't mean to imply by your testimony that all the work that was done on those fan guards was done in one room and all done by you, do you?

A. I received nine cents apiece for the fan guard built from the straight iron complete.

×-*Q.* 90. Did you japan them?

A. No, sir; they were not japanned. They were dipped in a solder, blocked, tinned and nickel-plated, which I did.

×-*Q.* 91. But I don't understand that you always were paid by piece work, do I? Didn't you say that you were paid by the day?

A. At the start of my employment there I did not work on piece work. Very shortly after I was employed there I went on piece work.

×-*Q.* 92. When Mr. Smith came to see you at St. Paul where did you see him there?

A. If I remember it right, I think Mr. Smith came to my home.

×-*Q.* 93. Where was that?

A. That was at 155 Ninth Avenue, if I remember. It was a double house and I lived in both sides of that house; I might have been at 153. It was either one side or the other.

×-*Q.* 94. But it was at one or the other of those places?

A. At one or the other.

×-*Q.* 95. You have not got a very good memory, have you?

A. Well, I have always had a pretty good memory of things that went on.

×-*Q.* 96. Please try to recall any other thing that happened when Mr. Smith came to see you in St. Paul.

A. I don't remember of anything.

×-*Q.* 97. Now, is it not a fact that Mr. Smith did not have an interview with you at St. Paul, but at Warren, Ohio, where you had gone to attend your sick father?

A. I also had an interview with Mr. Smith at Warren, Ohio.

×-*Q.* 98. Mr. Smith, who is here, tells me that he was never in in St. Paul in his life.

A. To my recollection, Mr. Smith and I had an interview at St. Paul, also another at Warren, Ohio.

×-*Q.* 99. Well, you may be mistaken about his having an interview with you in St. Paul, may you not?

A. The statement which I gave before covers that question.

×-*Q.* 99*a*. Please answer my question.

A. To the best of my recollection I had an interview with Mr. Smith in St. Paul.

×-*Q.* 100. But you may be mistaken about it. Is that a fact?

A. It is possible; yes.

×-*Q.* 101. What was the name of your father?

A. William M. Brewer.

×-*Q.* 102. Did he ever work for the Warren Electric and Specialty Company?

A. Yes, sir.

×-*Q.* 103. Where did he work?

A. In the packing department.

×-*Q.* 104. Did you ever assist your father in the packing department?

A. Yes, I have at times,— a few times in the early part of my employment with this company.

×-*Q.* 105. Where did you take the guards after you had formed them for the purpose of tinning them?

A. Down in the paint shop.

×-*Q.* 106. Where was that?

A. That was in a separate building at the rear end of the building in which I worked.

×-*Q.* 107. What was the tinning process that you have referred to?

A. It was block tin and soldered, melted, the guards were dipped in this hot solder and block tinned.

×-*Q.* 108. Describe a little more in detail how this dipping preparation occurred.

A. They were first dipped in a solution of muriatic acid, as I remember it, then into hot lead, the drops knocked off by a jar and finished.

×-*Q.* 109. Well, after they were tinned they were taken back to your department?

A. No, sir; they were taken to the department where they were lacquered.

×-*Q.* 110. But you took them to the tinning department?

A. Yes, sir.

×-*Q.* 111. How many of these guards did you construct in a day by means of this welding machine?

A. Well, it ranged between thirty and eighty.

×-*Q.* 112. Did you yourself do any of the tinning?

A. I did all the tinning.

×-*Q.* 113. Was that a part of your job?

A. That was a part of it, yes; guards complete.

×-*Q.* 114. Were you paid for the guards complete, that is, after they were tinned?

A. I was paid nine cents each for the guards built. I was then paid on an hourly basis for tinning the guards for the hours that I was on tinning.

×-*Q.* 115. Are we to understand that you were paid for building the guards and paid additional for tinning them?

A. Yes, sir.

×-*Q.* 116. While you were at the Warren Electric and Specialty Company did you ever drill any of the hubs or spiders for receiving the rivets?

A. Yes, on a bet, or a wager.

×-*Q.* 117. Well what was that wager?

A. Mr. Blood and I made a wager,— he was the man that drilled spiders, and I made a wager with him for $5.00 that I could drill 1,000 in one day, ten hours; that was the only drilling that I have done on spiders, to my recollection, and they were brass.

×-*Q.* 118. Well, did you win the bet?

A. I did not. Mr. Jack Powers slowed down the motor in the afternoon and I lost the bet because the drill press was not running at high speed.

×-*Q.* 119. Is it not the fact that when small guard rings were welded on this machine they were sometimes welded in a vertical position instead of a horizontal position?

A. You could weld on this machine both ways. It was possible.

×-*Q.* 120. The large guard rings were usually welded in a horizontal position?

A. Yes.

×-*Q.* 121. Do you remember the long strips of steel from which the blades of those fans were punched at the Warren factory?

A. No, sir, I don't. I don't remember that part of it. I remember the punching of the discs forming the armature, but not of the blades.

×-*Q.* 122. Referring again to this so-called interview with Mr. Smith at St. Paul, was it at night or during the day time?

A. It was in the evening, if I remember it.

×-*Q.* 123. Who else was present besides yourself and Mr. Smith?

A. No one. I don't think there was.

×-*Q.* 124. Are you as certain that Mr. Smith had this interview with you at St. Paul as you are about everything else that you have stated in your testimony?

A. I would not say positively as to my meeting Mr. Smith in St. Paul, but I had some idea that I had had an interview with Mr. Smith in St. Paul. Being uninteresting to me I may be wrong in this statement, but I had an interview with Mr. Smith, I am positive, in Warren, Ohio, when I visited my sick father.

×-*Q.* 125. When was that?

A. Along about the middle of May, 1917.

×-*Q.* 126. Who prepared the bath in which these guards were dipped for the tinning preparation?

A. I did.

×-*Q.* 127. Tell us how that was done.

A. It was a mixture of block tin and solder about, I should say, one-third,— if I remember it,— one-third block tin and the other two-thirds was solder, if I remember it right.

×-*Q.* 128. What did you do with these ingredients?

A. Put them in an iron kettle or pot, built a good fire under it, heated it to a certain degree of heat that would melt the metal and dipped the guards into this hot metal.

×-*Q.*129. And you mixed the metals, built the fire and did the dipping and performed the operation for getting the excess off?

A. Yes, sir.

×-*Q.* 130. Then what did you do with them?

A. Took them to Wakefield's room. Mr. Wakefield was the

man that done the lacquering at that time, and I took them to his room.

×-*Q.* 131. Yes; but you had to pickle these things before you dipped them?

A. They were pickled in the muriatic acid.

×-*Q.* 132. Who prepared that muriatic acid bath, yourself?

A. Yes, sir.

×-*Q.* 133. Well, all this took considerable time, didn't it?

A. Well, on an average of three days in two weeks. I would make guards for five or six days and might be in the paint shop a half a day or a whole day at a time and dip what I had made previously and then go back up and make the guards again.

×-*Q.* 134. And while you were processing, so to speak, these guards down stairs or in those other places, you were, of course, not working on your welding machine?

A. No, sir; at that time I was not working on the welding machine.

×-*Q.* 135. Now, going back to the welding machine, I wish you would describe in as much particularity as you may just exactly how you welded the guard on that machine, starting from the beginning and ending with the final operation which resulted in the completion of the weld.

A. After the rings being formed from a straight iron there were ten spokes, if I remember it, to be strung on one of the rings, the top ring of the fan, the spokes being hooked at either end, one hooked to the top ring of guard, the other hooked to centre ring of guard. After the spokes were strung on top ring of guard it was then welded on welding machine.

×-*Q.* 136. I want you to give me the details of the welding operation.

A. The rings were placed in jaws of welding machine, two of the levers clamping rings in the jaws, two of the levers butting ends of rings together to make the contact for welding.

×-*Q.* 137. Was that all?

A. That was all there was to it, besides stepping on the pedal putting on the current and taking it off when you are ready. The current was controlled by foot pedal.

X-*Q*. 138. Was not there a transformer connected with that machine, an electrical transformer?

A. There was a transformer connected.

X-*Q*. 139. What did that do?

A. As I am not an electrician, I could not state the function of transformer.

X-*Q*. 140. But you recall that there was one there?

A. Yes, sir.

X-*Q*. 141. I am going to ask you again to describe exactly where the pickling and tinning of these guards was done,— where the place was located.

A. During my employment with this company the pickling or tinning was first done in a blacksmith shop in the rear of the lacquering factory. Later, in the building in the rear of the fan motor factory in a separate building, brick, in the basement.

X-*Q*. 142. Was that what you would call the annealing room?

A. No, sir; to my recollection it was called the paint shop or bake oven in the latter building.

X-*Q*. 143. As a matter of fact, wasn't this pickling and tinning done in the same annealing room in which Mr. W. E. Smith worked in the annealing of transformer plates?

A. That I don't remember.

X-*Q*. 144. Would you say it was not done there — would you?

A. No, sir.

X-*Q*. 145. It might well have been done and you have no recollection of it?

A. I have no recollection of it.

Cross-examination closed.

Redirect Examination.

By Mr. STACKPOLE.

RDQ. 146. While you were in the employ of the Warren Company and making these fan guards was there any other regular operator employed to work on the workbench at which you worked?

A. No, sir. There were no other regular operators. At times in the busy season I had a helper who bent spokes entirely, never working on the welding machine to my knowledge.

RDQ. 147. Have you any interest in this case?

A. I have not; none whatsoever.

RDQ. 148. At the time you were working on this welding machine, was your brother, C. R. Brewer, employed by the Warren Company?

A. He was.

RDQ. 149. What was his work?

A. He built the cores of armatures for the fans.

RDQ. 150. Did he work in the same room with you?

A. Part of the time.

Signature and certificate waived.

Deposition of C. R. Brewer.

C. R. Brewer, having been duly sworn, deposes and says as follows: —

Direct Examination.

By Mr. Stackpole.

Q. 1. What is your name?

A. Charles Raymond Brewer.

Q. 2. Your age?

A. Thirty-seven.

Q. 3. Your occupation?

A. General superintendent of construction.

Q. 4. Where?

A. Most any place; different cities of the United States.

Q. 5. Where do you live?

A. I live in Hayward, Wisconsin.

Q. 6. Have you any connection with the Thomson Spot Welder Company or the Ford Motor Company?

A. I have not.

Q. 7. Have you any interest in this case?

A. No, sir.

Q. 8. Were you ever employed by the Warren Electric and Specialty Company of Warren, Ohio?

A. I was.

Q. 9. Were you employed there at the time your brother, L. Curtis Brewer, was butt welding fan guard rings on an electric welding machine?

A. Part of the time.

Q. 10. In what capacity were you employed at that time?

A. Well I was employed in different departments of the Warren Specialty Company. I was employed in the machine shop, in the transformer shop and in the fan motor department.

Q. 11. Did you ever see your brother butt weld fan guard rings on this machine?

A. I have.

Q. 12. Did you ever see anybody else welding on this machine?

A. I saw Mr. McBerty, Mr. McCurdy and Mr. Powers I believe, that is, when the machine was set up and tried out.

Q. 13. After the machine was set up and tried out did you see anybody else except your brother working on the machine?

A. No, sir.

Q. 14. How frequently did you see the machine?

A. Every day during my employment in the fan department.

Q. 15. Were you employed in the fan department at the time the machine was set up?

A. Yes, sir.

Q. 16. How many years were you employed by the Warren Company?

A. Parts of 1901, 1902 and 1903, in their busy seasons.

Q. 17. Can you describe the electrical device or welding machine which was used by your brother for butt welding the ends of fan guard rings?

A. As I remember it, it was a small machine placed upon a bench, the levers or handles projecting from the bench entirely, that is, the handles, and there being some sort of an insulated cardboard or fibre between the bench and the base of the welding machine. There are two clamps that held the ring in place and two clamps used for drawing the ends of rings together while making the weld.

Q. 18. You stated that there was a piece of fibre between the machine and the bench. State whether or not that piece of fibre was slit or not.

Mr. CHURCH. Objected to as leading.

A. As I remember it, the base was solid. There were no holes through the bench or through the fibre as I remember it.

Q. 19. I show you a photograph of a welding machine offered in evidence by the defendant. Does that photograph show generally the nature of the welding machine employed by the Warren Company at that time?

Mr. CHURCH. Objected to as leading.

A. It does with the exceptions of protruding from the bench and the base of the machine.

Q. 20. What do you mean by that?

A. As I remember the machine, it was mounted entirely upon the bench and did not protrude beyond the bench and had a solid iron base insulated by fibre or cardboard between the bench and the machine.

Q. 21. The photograph shows two angle irons. Were such angle irons on the machine?

A. Not as I recall the machine.

Q. 22. Did you ever see any other welding work done with this welding machine except the butt welding of the ends of fan guard rings?

A. I never did.

Q. 23. Do you know what spot welding is?

A. Yes, sir.

Q. 24. Did you ever see any spot welding done on this machine?

A. I never did.

Q. 25. Did you ever see any pieces that had been spot welded at that time?

A. No, sir, not at that time.

Q. 26. Do you recall the fan blades that were made of steel at that time?

A. I do.

Q. 27. What was their color?

A. As I remember it, they came to the factory packed in boxes, were very greasy when they came there and had to be cleaned and properly prepared for assembling.

Q. 28. Were they bright or were they dark?

A. I don't remember.

Q. 29. Were they punched for rivets?

A. I would not say whether they were punched when they came in or whether they were punched at our factory.

Q. 30. In the assembled fans how were the blades attached to the centre spiders?

A. By rivets while I was there.

Q. 31. By any other methods as far as you know?

A. Not that I know of.

Q. 32. Do you recall whether in any cases heads of the rivets were countersunk on the face of the blades?

A. It seems to me that during the latter part of my employment there the blades were countersunk and a flush rivet was inserted and the head was riveted on the back side of the spider; that is the way it seemed to me.

Direct examination closed.

Cross Examination.

By Mr. CHURCH.

X-*Q.* 33. You had nothing to do with the manufacture of the fans, did you, that is to say, the putting of the blades and the spider together?

A. No, sir.

X-*Q.* 34. The strips of steel from which the steel blades were made came in long strips, didn't they?

A. As I remember, the fan blades were shipped into the factory and I don't remember ever seeing any punching and I was at the punching machine every day to get my discs for the armatures while I was there.

X-*Q.* 35. Your idea is, then, that the blades themselves were brought in complete into the factory?

A. No, sir; just each blade, and the blade was riveted on the spider at the Warren factory and assembled there.

X-*Q.* 36. Your particular job was what?

A. While in the fan department, building armatures.

X-*Q.* 37. What did you do in the building of armatures?

A. We had a form in which we placed our shaft and riveted a washer on one end of the shaft and the small segments were rounded on this shaft. After we got the required amount of segments on, there was another washer riveted on the other end and then filed and were ready for the winding of the arm.

×-*Q.* 38. You had nothing to do with the building of the welder, had you?

A. No, sir.

×-*Q.* 39. Nor with the operation?

A. No, sir.

×-*Q.* 40. And you never did operate it?

A. I never did.

×-*Q.* 41. How many months in a year were you employed in the fan department of the Warren Electric and Specialty Company?

A. Well, I could not say; that is too long to remember.

×-*Q.* 42. Well, you were not employed the whole time?

A. As I remember it, I was employed the greater part of the three seasons that I was there, during 1901, 1902 and 1903. There was a time or two when the business was slack and I was let out because there was no work.

×-*Q.* 43. That is to say you were employed during the fan seasons of these years?

A. Yes, sir.

×-*Q.* 44. And the fan seasons did not extend throughout the whole year. How long was the fan season?

A. I don't remember.

×-*Q.* 45. More than two or three months?

A. Yes, sir; I was there longer than that.

Signature and certificate waived.

Adjourned to further notice.

BOSTON, MASS., July 3, 1919.

Met pursuant to agreement of counsel.

Deposition of Clifton V. Edwards.

CLIFTON V. EDWARDS, having been duly sworn, deposes and says as follows: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation.

A. Clifton V. Edwards; forty-seven years; residence, New York City; occupation, lawyer.

Q. 2. What, if anything, did you have to do with the suit of the *Thomson Electric Welding Co. et al.* v. *Barney & Berry*, which suit

was brought on the Harmatta patent here in suit and tried in the United States District Court for the District of Massachusetts?

A. My firm, Edwards, Sager & Wooster, was retained by the Toledo Electric Welder Company, a manufacturer of the machine used by the defendant, to defend the case and I had charge of the defense.

Q. 3. Did you personally conduct the defense in the trial before Judge Dodge?

A. I did.

Q. 4. Did you argue the case for the defendant in the various hearings which were held in the District Court and in the Court of Appeals?

A. Yes; I had charge of the case from the beginning, passed upon the evidence to be used in the trial, conducted the trial of the case before Judge Dodge, argued it before Judge Dodge and in association with my partner, Mr. Sager, argued it in the Court of Appeals and also supervised the preparation of all motions and other actions on behalf of the defendant in the case.

Q. 5. What did you do in connection with the briefs for the defendant in that case?

A. I wrote personally a large part, if not the main part, of all of the briefs with the assistance of Mr. Sager, who participated in all of them.

Q. 6. Were briefs filed for the defendant in the District Court and in the Court of Appeals?

A. Yes, in both courts.

Q. 7. Do you know Fred P. McBerty?

A. Yes; I met him in connection with the Barney & Berry case.

Q. 8. Mr. McBerty has testified for the defendant in the case at bar and has intimated that the defense in the Barney & Berry case was not conducted as vigorously as possible and that there was some collusion between the plaintiffs in that case and the Toledo Electric Welder Company, which had undertaken the defense. Will you please state the facts as to these matters and the circumstances relating thereto?

Mr. CHURCH. Objected to as incompetent and as calling for hearsay testimony, the witness not having been shown to have any per-

sonal knowledge of any arrangement between his client and the plaintiff in the Barney & Berry case.

A. I am very certain that there was absolutely no collusion in that case. Before the Barney & Berry suit was brought we had defended another suit for the Toledo Electric Welder Company brought against that company by the Thomson Company; that case was the Thomson Electric Welder Company or Thomson Electric Welding Company against the North & Judd Manufacturing Company and I believe the Toledo Electric Welder Company was a nominal party also in the District of Connecticut. During the litigation and when the litigation on the Harmatta patent was threatened Mr. Warren, the principal stockholder and active head of the Toledo Electric Welder Company, took me into his confidence as to the financial status of his company and consulted me frequently from time to time as to the best terms to be made by his company from the business standpoint of extending his business and the financial situation as regarding his ability to stand the litigation, and I believe that I was very closely in touch with everything of importance to the defendant that happened throughout the entire period of the litigation on the Harmatta patent. I am certain that neither Mr. Warren nor anybody else ever intimated to me or to anyone on our side of the case that an honest and successful defense was not desired and we were never limited or stinted or questioned as to the money spent on the defense. We made the best defense we could.

Q. 9. Do you recall any negotiations for a settlement of the Barney & Berry case; and, if so, what effect did that have upon the vigor of your defense?

A. Negotiations for a settlement were in the air practically at all times. Mr. Warren, Mr. McBerty and representatives of another welder company, I think the Winfield Company, and another concern, Geuder, Paeschke & Fry, I think that is the name of the concern, met me at various times and expressed the thought that was often expressed to me by Mr. Warren that it would be a good thing for the benefit of the welder industry if a license could be obtained under the Harmatta patent and at various times we tried to bring that about. Every attempt failed because generally the Thomson Company wanted too much in the way of royalty, at least

more than the others thought they were willing to pay. There was never, however, any thought expressed by anyone that it would be desirable or safe to let the Thomson Company achieve a victory before settlement, because we all felt that if that happened the Thomson Company would either keep the field to itself or exact a prohibitive royalty and none of us felt like taking that chance. Certainly the possibility of a settlement never in the slightest degree diminished our effort to defeat the patent in the trial of the case. We did hope that a trial could be avoided, but never for a moment allowed that thought to interfere with our preparation of the defense.

Q. 10. When you tried the Barney & Berry case, had you heard of an alleged prior use by Fred P. McBerty? And, if so, please state the circumstances.

A. Yes, I heard of it and had it investigated. It came to my attention first from correspondence from Mr. Warren to the effect that Mr. McBerty suggested our getting in touch with his lawyer, Mr. McGill. I saw Mr. Gill, who said he had examined into the matter but did not feel like telling us about it unless expressly authorized by his client; such authorization was subsequently given and Mr. McGill came into my office just as he was leaving for Europe and left with me some statements by proposed witnesses and I think with them was a sample fan blade. After some correspondence I think Mr. McBerty came into the office and I discussed the matter with him and arranged with him to have Mr. Thomas Howe, at that time employed by my firm, go to Warren and wherever else necessary to investigate the proposed defense, to interview proposed witnesses, secure affidavits from them and also to find, if possible, some record evidence to substantiate Mr. McBerty's statements as to the welding of the fan blade. Mr. Howe went to Ohio and after some days returned and delivered to me a number of affidavits and some records and a fan blade which I am quite sure is the same fan blade that was given to me by Mr. McGill and turned over to Mr. Howe. I read the affidavits, talked the matter over with Mr. Warren, also with Mr. McBerty, Mr. Sager and Mr. Howe, and concluded not to press the alleged defense in the trial of the case.

Q. 11. In your interview with Mr. McBerty to what extent did

he tell you he had practiced spot welding at the time in question covered by the affidavits?

Mr. CHURCH. Objected to as calling for hearsay testimony.

A. He said that he or someone associated with him had on one occasion manipulated a butt welding machine by inserting copper rod terminals in the jaws of the machine and inserting between these terminals a fan blade and a spider for carrying the blades and had welded the blade to the spider in the manner shown in the sample which was subsequently annexed to one of the affidavits prepared by Mr. Howe. This sample was not a complete fan wheel, but only comprised one blade and part of a spider. I think he said that the other three blades of the fan had been welded in similar manner, but at any rate the fan had been cut up and he had only been able to find that one blade. He said that these welded fans had not been put into production because the fan blades and spiders for that season's output had already been punched for rivets and that if they used the welded blade they would have to scrap these fan blades and spiders. He also said that none of them had been sold or put into use and that none had been welded except upon the one occasion referred to. He also said that so far as he knew there were no records to establish the date of the experiment as he called it, the exact nature of it or any subsequent use, and of the records found by Mr. Howe, none related directly to these features.

Q. 12. You state that you decided not to make use of this so-called McBerty defence in the Barney & Berry case; what were your reasons for that conclusion?

Mr. CHURCH. Objected to as irrelevant and immaterial and as not calling for evidence, but mere opinion.

A. First, because after reading the affidavits and after hearing Mr. McBerty's version, neither I nor Mr. Sager nor Mr. Warren believed the story. Second, because it seems to me that even if all that Mr. McBerty said had happened, had actually happened, it was nothing more than an accidental experiment and whatever its nature was it was evidently considered by him to be useless for any practical purpose.

Q. 12*a*. It appears from the record in the Barney & Berry case that you asked Mr. McBerty whether he had done any spot weld-

ing before the date of the Harmatta application and that on objection he was not permitted to answer. What was the purpose of your question?

Mr. CHURCH. Objected to as incompetent and immaterial. The question speaks for itself.

A. We made no attempt to set up this defence in our answer because I did not believe that the story would stand cross-examination, but at the trial of the case Mr. McBerty was present and seemed to think that the court ought to know that he claimed to have done the same thing as set out in the Harmatta patent. We were attempting to show that the transition from a butt welder to a spot welder was a natural one and had been adopted in the natural course of business by our client, the Toledo Electric Welder Company; with a view to showing that no inventive act was involved in making the transition I asked Mr. McBerty a question intended to bring out that he had made a similar transition as a matter of course. We sought to have the question allowed, as I recollect it, in order to show the state of the art rather than to set up a public use. The question was disallowed much to the satisfaction of counsel on our side, because we felt that Mr. McBerty had had his opportunity to put on record his claim, and second that it might give us ground in the Court of Appeals for taking exception to the exclusion of evidence intended to show non-invention, even though not set up in the answer.

Cross Examination.

By Mr. CHURCH.

×-*Q.* 13. What suits beside the Barney & Berry suit and the suit against the North & Judd Manufacturing Company, brought by the Thomson Electric Welding Company and other, did you defend for the Toledo Electric Welder Company?

A. There was one in Brooklyn; I am not sure of the name of the defendant, but I think it was the United States Metal Products Company and I think the patent was one to Rietzel. I think we were consulted about some interferences, but this I do not recall very clearly and there were many threatened suits against customers.

×-*Q.* 14. The suit against United States Metal Products Company to which you referred was entitled the Thomson Electric

Welding Company and the Universal Electric Welding Company, plaintiffs, against the United States Metal Products Company, defendants, in equity No. 11, and was brought in the United States District Court for the Eastern District of New York, was it not?

A. That is no doubt the case.

×-*Q.* 15. A copy of the bill, answer and replication in that suit has been offered in evidence as Exhibit No. 48, and from the bill of complaint it appears that the Toledo Electric Welder Company was invited to come in and be made a party defendant; do you recall that fact?

A. No, I do not recall that fact. I have no present recollection of this, but I note that seems to be the case in the copy of the bill you showed me.

×-*Q.* 16. It appears from the copy of the bill as shown you that the same was verified on the 20th of March, 1912. It also appears from this record that the answer was filed bearing the name of your firm, Edwards, Sager & Wooster, as solicitors for defendant, and that a general replication was filed by Henry C. Townsend, solicitor for complainant. Will you state whether this cause ever came to hearing; and, if not, why not?

A. The cause never went to hearing. I do not know of any reason why it did not go to hearing, except that the complainant did not bring it to hearing.

×-*Q.* 17. It appears from the record of the trial of the Barney & Berry suit that the machine whose use was charged to be an infringement of the Rietzel patent in the suit against the United States Metal Products Company practiced spot welding, such as was practiced by the defendant by the use of a similar machine in the Barney & Berry suit. Does this accord with your recollection?

A. I am not sure about that, but my present recollection is that the machine in the United States Metal Products case was a machine that spot welded by striking up the metal to be welded. I think the plaintiff called it projection welding; while the machine in the Barney & Berry case did not operate upon struck up metal, but practiced spot welding by electrodes having an area substantially the same size as the area of the weld to be made.

×-*Q.* 18. What were the articles made by the United States Metal Products Company?

A. That I do not recall.

×-*Q.* 19. You mean, do you not, that the specific application of electric welding shown in the Rietzel patent involved the striking up of the metal so as to form projections and the welding of the projections, while the application of electric welding shown in the Harmatta patent involved in the Barney & Berry suit was the welding at spots of plane faced plates?

A. At this time I would not undertake to say what was involved in respect to patents, but, as I understand, your statement seems substantially correct in this, that in the United States Metal Products case, as I recall it, the defendant struck up the metal in points in the places where the weld was desired, the welds being what I would call spots at least in that they were small areas and the welding was accomplished by putting these struck up plates in between the electrodes having areas much larger than the spot or place to be welded, while in the Barney & Berry case the plates were flat plates having no projections and the electrodes were copper points or pencils having small contact areas which pressed against the flat plates and made a weld of substantially the same area as the surface of the electrodes. They both made isolated welded points or spaces or areas of contact.

×-*Q.* 20. Let me see if a few references to the Barney & Berry record may refresh your recollection. When Mr. Frank Warren was on the stand as witness for the defendant in that suit he was asked by you the following question: —

"*Int.* 40. And again, in 1911, was one of your customers sued by the Thomson Electric Welding Company and the Universal Electric Welding Company?

"Mr. Fish. That is the same objection, your Honor; it has nothing to do with spot welding.

"Mr. Edwards. This has to do with spot welding. This is a spot welding suit, this particular patent I am coming to now.

"The Court. On the statement that it has to do with welding you may go on.

"*Ans.* We were sued by them; that is, the United States Metal Products Company were sued by them.

"Mr. FISH. By whom?

"The WITNESS. By the Thomson Company and the Universal Company, under the Rietzel patent, and that suit was filed March 12, 1912.

"The COURT. One moment. Your question did not call upon you to give any particulars regarding it.

"*Int.* 41. You can just say 'yes' to shorten the matter.

"*Ans.* Yes.

"*Int.* 42. Was not the suit referred to one brought in the United States District Court for the Eastern District of New York by the Thomson Electric Welding Company and the Universal Electric Welding Company, plaintiffs, against the United States Metal Products Company, upon Rietzel patent No. 928,701?

"*Ans.* Yes.

"*Int.* 43. And the United States Metal Products Company was a user of one of the Toledo Electric Welding machines, was it?

"*Ans.* Yes, sir.

"*Int.* 44. Can you point out in one of these bulletins or describe to the court the character of the machines used by the United States Metal Products Company?

"*Ans.* I can.

"Mr. STACKPOLE. We object to this, your Honor; it has nothing to do with the Harmatta patent.

"Mr. EDWARDS. Now, I offer in evidence a copy of the Rietzel patent No. 928,701, upon which such suit was based. The same is marked 'Defendant's Exhibit L'."

Then follows this:

"Mr. FISH. Do I understand any welding machine can be used for an indefinite number of electric welding processes? Now, the specific process of Rietzel was one thing. The Rietzel patent had some generic claims that might be construed as for a generic invention back of both those processes. Those claims of Rietzel were practically eliminated from consideration by the result of the interference by which the Harmatta process is entitled to those claims if anyone is. Now, I suppose the specific question that is under consideration — I should have no doubt that the specific process that we claim here as an infringement of the Harmatta patent was

the specific process and the same process as that used by the defendant in the suit that was brought on the Rietzel patent.

"Mr. Edwards. If you concede that, why not concede the additional fact that they were performed by substantially the same machine?

"Mr. Fish. Well, I don't know the machine; I don't care anything about the machine.

"Mr. Edwards. Why not let us show that? It would be answered in a very simple question.

"The Court. Upon the admission of the plaintiff I think I will exclude evidence calling for a description of the machine.

"Mr. Edwards. I respectfully except.

"*Int.* 45. Was the machine used by the United States Metal Products for performing the process charged as an infringement in the United States Metal Products case substantially the same kind of machine as is used by the Barney & Berry Company in the present case?

"Mr. Fish. I think it is.

"*Ans.* Yes."

Does what I have thus read refresh your recollection as to the machine used by the defendant in the Barney & Berry suit being the same as the machine used by the defendant in the case of the United States Metal Products Company?

A. That accords with my present recollection, as stated above. It was our contention at the trial that the Harmatta claims were broad enough to cover the use of both forms of machines, and we sought to show the specific character of the Brooklyn machine.

×-*Q.* 21. Are you prepared to affirmatively state that the Toledo electric spot welding machine used by the United States Metal Products Company was not used by that company prior to the bringing of that suit against it for the electric spot welding of plates or parts that had no pre-formed projections at the points of welding?

A. At this late date I would not of course be prepared to say what the United States Metal Products Company did, but to the best of my recollection the only use by the United States Metal Products Company that I knew of was the projection welding as above stated.

×-*Q.* 22. Was any other user of a Toledo spot welding machine

employed to weld plane faced plates or parts at spots ever threatened under the Rietzel patent?

A. I would not say that any of such users were threatened under the Rietzel patent. I have no present recollection that any users of Toledo machines welding upon flat plates was threatened under the Rietzel patent.

×-*Q.* 23. Were any other suits besides the ones that have been named brought under the Rietzel patent and defended by you?

A. No; I think the United States Metal Products suit was the only suit brought under the Rietzel patent.

×-*Q.* 24. When you were called upon to defend the suit against the United States Metal Products Company did you know of the previous suit that had been brought by the Thomson Electric Welding Company and the Universal Electric Welding Company against the National Enameling & Stamping Company in the Circuit Court of the United States for the Southern District of New York upon the Rietzel patent No. 928,701, dated July 20, 1909?

A. At this moment I have only a vague recollection that we did hear of some such litigation, and very likely we did.

×-*Q.* 25. Refreshing your recollection by examination of the answer of the defendant in that case and the answer filed by you in the Metal Products case, don't you think you got your materials for the defense largely from the answer in the first named case?

A. I could not say as to that, but if you will let me look at the answer referred to that may help my recollection. A cursory examination of the printed copies of the answer that you show me indicates that apparently everything that was set up in the National Enameling Company's case was reasserted in the answer in the United States Metal Products case. Perhaps further examination might show something in the United States Metal Products case not in the National Enameling & Stamping Company's case, but I have no doubt after looking at these answers that we knew of the National Enameling case and availed ourselves fully of everything set up in the answer of that case in preparing our answer in the United States Metal Products case.

×-*Q.* 26. Did you take any part in the defense of or in the gathering of materials for the defense of the suit brought against the National Enameling & Stamping Company?

A. I think not, but I also have an indistinct recollection that I saw either Mr. Untermeyer or someone connected with the defendant's counsel in the National Enameling case and it is not impossible that we may have handed to them some of the material set up in their answer. I have no doubt that we would have been glad to have given them anything that we had that might help them.

Redirect Examination by Mr. STACKPOLE.

RDQ. 27. You specialize in Patent Law, do you not, Mr. Edwards?

A. Yes.

Signature and certificate waived.

Adjourned to the same place at 11 A. M., Monday, July 7th.

Deposition of Thomas Howe, Esq.

BOSTON, MASS., July 7, 1919.

Met pursuant to agreement of counsel.

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation?

A. Thomas Howe; forty-three years old; White Plains, New York; occupation, patent attorney.

Q. 2. Were you ever associated with the firm of Edwards, Sager & Wooster, of New York?

A. I was.

Q. 3. During what years?

A. From November, 1908, until January 1, 1914. I don't remember the day in November.

Q. 4. While you were associated with Edwards, Sager & Wooster, did you have anything to do with a suit brought by the Thomson Electric Welding Company against Barney & Berry on the Harmatta patent?

A. Yes, I did.

Q. 5. Do you know Fred P. McBerty?

A. Yes, I do.

Q. 6. Did you meet Mr. McBerty in connection with your work on the suit of the Thomson Company *v.* Barney & Berry? And, if so, state the circumstances.

A. As I said before, I was employed in the office of Edwards, Sager & Wooster, and in the summer of 1913 Mr. Edwards advised me of this suit of the Thomson Company against the Barney & Berry Company, and it seemed to me that Mr. McBerty's company, namely, the National Electric Welder Company of Warren, Ohio, would be interested to see the Barney & Berry Company successful in the suit on the Harmatta patent; that he, Mr. Edwards, would like to have me go out to Warren, Ohio, and that Mr. McBerty would aid me in every way possible to obtain evidence of a use of spot welding which was said to have been made before the Harmatta invention. It was in connection with this matter that I was introduced to McBerty in the office of Edwards, Sager & Wooster, of New York.

Q. 7. What, if anything, did you do towards obtaining evidence of the alleged prior use referred to in your last answer?

A. Mr. Edwards gave to me some sort of a written statement which, as I understood, had been obtained by Mr. McBerty from persons who were thought to have some knowledge of the early use of spot welding by Mr. McBerty and it seems to me there were one or two articles, one of which it seems to me was some sort of a sample of welding work, which had been given to Mr. Edwards as I understood it, and with all of the matters which were in the trial of this case in the office of Edwards, Sager & Wooster and all other things of which I had a knowledge in connection with this matter I took with me and went out to Warren, Ohio, to see Mr. McBerty and such people as he might take me to to obtain information regarding his further use of spot welding. I knew none of the people that I was to see and as I understood it Mr. McBerty was going to do everything that he could to aid in defeating the Harmatta patent, because if the Thomson Company should be successful in its suit against the Barney & Berry Company it was thought that it would very materially interfere with his company, that is the National Electric Welder Company, and I was given to understand by Mr. Edwards that Mr. McBerty would do everything in his power to establish this early use of spot welding by him and was assured by Mr. McBerty that he would do so, and apparently he did do so. I made my headquarters while in Warren in Mr. McBerty's office.

I prepared all of the affidavits which I found it necessary to pre-

pare in his office, and he gave up a great part of his time, in fact I might say all of his time, while I was in Warren to taking me around town introducing me to various people who might know something of his spot welding, and he also took me to Detroit to see a Mr. Brown and a Mr. Lipps. Mr. McBerty took me about by himself considerably, and I recall that he would get his friend, Mr. Newton A. Wolcott of the Packard Electric Company, to take Mr. McBerty and myself in Mr. Wolcott's car to see anybody that it was thought would know anything about the matter under investigation. I also recall going out into the country for a considerable distance with Mr. McBerty to see a man by the name of McDonald, who had gone out on a farm to live and who Mr. McBerty thought might know something about the matter. I recall that altogether we canvassed this matter thoroughly from top to bottom, seeing everyone who was suggested might perhaps know anything about the situation and getting the affidavits of those who apparently did not know very much about the matter so as to have a record of who did know anything about it. I recall that, when we went to see Mr. McDonald, Mr. McBerty thought that probably he wouldn't know very much about it, but to make sure that nothing should be overlooked I said that it would be better to go and find out what he did know. Mr. McBerty proved to be right in that instance because Mr. McDonald did not seem to have much recollection in regard to the early welding, and there being no notary out in the country where he was located I wrote out a statement for him to execute when he should come to town and Mr. McBerty was to forward this to me. This, however, was not done. Mr. McBerty also took me to the Enterprise Electric Company and introduced me to the people there; also to the Peerless Company and numerous other places and did everything possible so far as I could see to give me all the information that he could and to put me in touch with all sorts of information that he could. I understood my errand to be to get everything that could possibly be found in relation to this early welding in the concrete form of affidavits so that I could present them to Mr. Edwards and he could thereupon form his judgment concerning the matter in relation to the Barney & Berry case. I did this to the utmost of my ability and omitted nothing that seemed to me by any possibility could have any bearing on the

situation, and Mr. McBerty gave me to understand that he apparently did put me in possession with everything he knew about. I was somewhat concerned in the case because almost everthing seemed to depend upon recollection of the persons who knew anything about the matter, and I was therefore especially urgent to get some documentary evidence or contemporaneously dated articles of some kind which would corroborate the recollection of the witnesses. Such material seemed very scarce and I again and again urged it upon Mr. McBerty that it would be of very great assistance if some such contemporaneous material could be obtained. We scanned the situation again and again and apparently Mr. McBerty did everthing that was possible for him to do to produce all the tangible date evidence that he could.

Q. 8. Did you at that time obtain an affidavit from Mr. McBerty himself concerning this early welding?

A. I did.

Q. 9. Were you present at the recent hearing in Detroit before Judge Killits?

A. I was.

Q. 10. Mr. McBerty there testified, and during his cross-examination was shown an affidavit dated October 9, 1913, which he identified. What, if anything, did you have to do with the preparation of that affidavit?

A. With Mr. McBerty's assistance, I prepared it.

Q. 11. Mr. McBerty in his testimony stated that he in 1901 spot welded a number of complete fan blades and spiders, and that such spot welded fan blades and spiders went through the factory and were put into the regular fans. What, if anything, did Mr. McBerty tell you in 1913 about the spot welding of complete fan blades and spiders?

A. He said that they had made one fan, one complete structure, —by a complete structure I mean the central part which has been referred to as spider with a blade secured to each of the arms of the spider. In this connection I was very insistent to learn if more of these fan blade structures had not been made, and especially I was desirous of establishing that there had been some commercial use made of these fan structures because I believe this would have made our case of prior use immeasurably stronger

but I was unable to find out by McBerty or anyone that there had been a commercial use of them, in fact was told there was no commercial use; the reason was that Mr. Gillmer had decided not to put them into commercial use because of financial considerations, and that ended the matter.

Mr. CHURCH. All that part of the answer beginning with the sentence "In this connection" and continuing on to the end is objected to as not responsive to the question, as incompetent and hearsay, and, if it is intended as a contradiction of any testimony given by Mr. McBerty or any other witness for the defendant while on the stand, as incompetent, no proper foundation having been made during the examination of Mr. McBerty for such contradictions.

Q. 12. Mr. McBerty testified that a fan with spot welded blades and spider was photographed, a cut made from the photograph and reproduced in a catalogue of the Warren Electric and Specialty Company for the season of 1901. What, if anything, of these circumstances did Mr. McBerty tell you in 1913?

A. He said nothing of the things which you mentioned. In fact he did not tell me that a complete fan structure, that is including the motor, fan, guard, etc., and including spot welded blades, had been built around that time, or in fact at any time.

Mr. CHURCH. All of the answer included in the last sentence beginning with the words "In fact" are objected to as irresponsive and as containing the volunteered testimony of a swift witness and therefore incompetent, irrelevant and immaterial.

Q. 13. At the hearing before Judge Killits affidavits of Mr. Lipps and a Mr. Gilder were introduced during their respective cross-examinations; did you prepare those affidavits?

A. Yes.

Q. 14. While you were investigating this prior use with Mr. McBerty did he take you to see a man by the name of William Smith or William E. Smith?

A. He did not.

Q. 15. Did he suggest your seeing such a Mr. Smith in connection with this alleged prior use?

A. He did not.

Q. 16. In connection with this alleged prior use did you go to see a Mr. Edward Craft or Crafts?

A. I did.

Q. 17. What did Mr. Craft tell you about this matter?

Mr. CHURCH. Objected to as calling for hearsay testimony and, if not, as incompetent if intended to contradict anything testified to by Mr. Craft while on the stand as witness for the defendant, no proper foundation having been laid for such contradiction.

A. After I returned from Warren and Detroit I went to see Mr. Craft at the office of the Western Electric Company in New York. Mr. Craft said that it had been a good many years ago and that he did not recollect the matter very much so that he did not care to give me an affidavit.

Q. 18. Did you obtain an affidavit from Mr. Craft?

A. I did not.

Q. 19. While you were investigating this matter with McBerty in Warren in 1913 did he show you the welding device on which this welding was said to have been done?

A. He showed me a structure which he said was the welding device of his early use, but it was not complete at the time I saw it.

Q. 20. In what way was it not complete?

A. So far as spot welding was concerned, it had no points and clamps with which to do spot welding and Mr. McBerty said that the transformer was not in shape to operate. It lacked some other parts which I do not now recall definitely.

Q. 21. Did Mr. McBerty show you the transformer that went with this welder?

A. I cannot recollect seeing the transformer.

Q. 22. Was the welding device mounted as it was mounted at the hearing before Judge Killits?

A. No, it was not.

Q. 23. Did McBerty do any welding for you with this welding device?

A. He did not.

Q. 24. I show you a number of papers, all of which have the caption "In the United States District Court, District of Massachusetts, Thomson Electric Welding Co. et al. *v.* Barney & Berry Inc.", which purport to be affidavits of the following persons:

Frank G. Brown, Austin C. Pendelton, Rolland F. Pfile, Milton W. Betchel, Charles B. McCurdy, Oscar P. Pilz, Newton A. Wolcott, Walter T. Wakefield, David R. Estabrook, Robert W. Bean, Alton J. Lewis, Robert J. Meenely, Edward Bettiker, Alfred Ulp. Please state whether you recognize these papers; and, if so, as what.

A. Yes, I recognize these as affidavits secured by me on my trip to Warren and Detroit in the fall of 1913. These affidavits were prepared by me.

Q. 25. Are these the affidavits or some of them concerning which you have testified?

A. They are.

(The affidavits are offered in evidence by the plaintiff, and the same are marked "Plaintiff's Exhibit No. 33, Affidavits of Messrs. Brown, Pendleton, Pfile, Betchel, McCurdy, Pilz, Wolcott, Wakefield, Estabrook, Bean, Lewis, Meenely, Bettiker and Ulp obtained by Mr. Howe".)

Mr. CHURCH. The affidavits offered are objected to as incompetent, irrelevant and immaterial and as hearsay, the affiants for ought that appears being available as witnesses in this case.

Q. 26. Were these affidavits marked "Exhibit No. 33" obtained with Mr. Berty's assistance and knowledge?

A. They were. He was present, I think, in every instance when I talked over the matter and knew of the affidavits which they executed.

Q. 27. Are these affidavits marked "Exhibit No. 33" and the affidavits of Messrs. McBerty, Lipps and Gilder, already introduced in evidence, all the affidavits obtained by you in connection with this McBerty use?

A. I believe so; I don't recollect anyone else; the affidavits were all turned in and kept together.

Q. 28. After you had collected all the affidavits and the information concerning this McBerty use what did you do with them?

A. Put them in the file of the case at the office of Messrs. Edwards, Sager & Wooster after showing them to Mr. Edwards.

No cross-examination.

Signature and certificate waived.

Deposition of Wilbur F. Turner.

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, age, residence and occupation.

A. Wilbur F. Turner; 10 Scotland Road, Reading; business, expert and commercial photographer; age, fifty-nine years.

Q. 2. How long have you been practicing your present profession?

A. Thirty years.

Q. 3. I show you a cut of a desk fan, namely, Fig. 36, Peerless, enclosed field fan motor, which appears at the lower right-hand corner of page 163 of the April, 1901, number of the American Electrician, and also a photograph of a cut marked "G-2" which is a reproduction of page 17 of the catalogue of the Warren Electric and Specialty Company for the year 1901. These cuts are said to be identical. From your knowledge of commercial photography can you state the process by which these cuts were made?

A. I can.

Q. 4. Please do so.

A. These cuts were produced from photographs taken from the original fan, then retouched with the air brush and half-tone cuts made from them.

Q. 5. What is the process of retouching with the air brush?

A. An air brush sprays on the liquid color, giving a nice even surface, — the object of that is to smooth up the surface so that it will reproduce smooth and brilliant, — then in each drawing the lines are brought up with a pen or a fine-pointed brush. In this process it is possible to eliminate anything in the drawing or photograph that is not wanted to show in the original cut.

Q. 6. I show you here a fan with a centre and four blades attached thereto with rivets. Did you at my request make a photograph of that fan?

A. I did.

Q. 7. Please produce the photograph.

A. I here produce the photo.

(The photograph produced by the witness is marked "Plaintiff's Exhibit No. 34, Turner Photograph of Riveted Fan"; and the fan centre and rivet blades identified by the witness are offered in evidence as "Plaintiff's Exhibit No. 35, Fan Spider with Riveted Blade".)

Mr. CHURCH. Objected to as irrelevant, immaterial and incompetent.

Q. 8. After you had taken this photograph, what was the next step that was done to cause the production of a cut of this fan?

A. The photograph was retouched and lined up and a half-tone cut made of it.

Q. 9. How was the photograph retouched?

A. With the air brush and fine pointed brush and some pen work.

Q. 10. What was the effect of the retouching on the showing of the rivet heads shown in Plaintiff's Exhibit No. 34?

A. That removed the rivet heads.

Q. 11. Please state whether or not such result would ordinarily occur in retouching such exhibit as No. 34.

A. It would.

Q. 12. Have you the retouched photograph? And, if so, please produce it.

A. I have.

(The retouched photograph is offered in evidence and marked "Plaintiff's Exhibit No. 36, Turner Retouched Photograph of Riveted Fan".)

Q. 13. Can you produce the cut made from the retouched photograph?

A. I can.

(The cut produced by the witness is offered in evidence and marked "Plaintiff's Exhibit No. 37, Cut of Retouched Photograph of Riveted Fan".)

Q. 14. In case it was desired to show the rivet heads in the final cut, how would that be done?

A. With a small brush.

Q. 15. Can you state from your knowledge of commercial pho-

tography whether the same process which you employed to produce Plaintiff's Exhibit No. 37 was employed to produce the cut of figure 36 of the April, 1901, number of American Electrician and the cut of the G-2 fan above referred to?

A. Yes, the same process all the way through.

Q. 16. Was that process in common use in 1901?

A. Yes, sir.

Q. 17. If the original fan in which the cut in the American Electrician and the cut of the G-2 fan above referred to had rivet heads on the fan blades as in Plaintiff's Exhibit No. 35, would those rivet heads show in the final cut?

A. No, not in this case; those [*pointing to the cut in the American Electrician and the cut of the G-2 fan*] have been covered and sprayed, as in the cut made by me.

Q. 18. Please read on the record the name plate on the motor part of the fan of which you made the photograph.

A. "Peerless direct current fan motors, volts 240 amp. .4 type, G-2 No. 4454. Peerless Electric Company, Warren, Ohio."

No cross-examination.

Deposition closed.

Signature and certificate waived.

(Plaintiff's counsel states that he has received from Mr. L. C. Brewer the two photographs which Mr. Brewer stated were given him by Mr. William E. Smith and these photographs are marked with the name "L. C. Brewer". They are offered in evidence and marked, respectively, as "Plaintiff's Exhibit No. 38, Photograph No. 1, shown to Brewer by Wm. E. Smith", and "Plaintiff's Exhibit No. 39, Photograph No 2, shown to Brewer by Wm. E. Smith".)

Adjourned.

WARREN, OHIO, July 10, 1919, 11.30 A. M.

Met pursuant to agreement of counsel.

Present: J. L. STACKPOLE, Esq., Counsel for Plaintiff;
A. S. PATTISON, Esq., Counsel for Defendant.

Depositions taken on behalf of the plaintiff under the Equity Rules of the Supreme Court of the United States and under the Revised Statutes. Before me,

W. S. HELSLEY,
Notary Public and Special Examiner.

Deposition of Charles G. Wolfe.

CHARLES G. WOLFE, being by me first duly sworn to tell the truth, the whole truth and nothing but the truth, deposes and says as follows: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Your age?

A. Forty-one.

Q. 2. Your residence?

A. 37 South Linden Avenue, Warren, Ohio.

Q. 3. Your occupation?

A. Carpenter and contractor.

Q. 4. Were you ever employed by the Warren Electric and Specialty Company of Warren, Ohio?

A. Yes, sir.

Q. 5. Do you recall in what years?

A. I think I started there in January, about the latter part of January, in 1900.

Q. 6. And worked there how long?

A. Well, I quit or was laid off and went back several times. In all I suppose there would be in the neighborhood of two years.

Q. 7. Do you recall an electric welding machine that was used at the plant of the Warren Electric and Specialty Company for welding fan guard rings?

A. Yes, sir.

Q. 8. Did you have anything to do with making that machine?

A. Inasmuch as I helped Mr. McBerty.

Q. 9. Helped Mr. McBerty do what?

A. To place the machine and make a few little changes on there which I don't know just exactly what they are now, not being interested in the case.

Q. 10. Did you assist Mr. McBerty in mounting it upon the bench and getting it started?

A. I don't know just how to fix that. I did in a way, inasmuch as a kind of helper in the case.

Q. 11. What was your regular job at that time?

A. Assembling fan motors.

Q. 12. I show you a picture of a device purporting to represent an electric welding machine, which is marked "Plaintiff's Exhibit No. 39". Did you recognize any part of this device?

A. I recognize the top part of it there as being original.

Q. 13. Do you recognize any part as being original?

A. I don't remember of the projecting out that far from the bench and I don't remember of the angle irons,— or is that wood or irons in under there?

Q. 14. The angle irons under the arms.

A. The vision I had of that machine it set on fibre flush, or nearly flush, with the bench.

Q. 15. You mean by that a fibre plate?

A. Yes, something; I don't have an idea of it projecting over an inch if it did that.

Q. 16. Was there an opportunity to stick a fan blade or sheet of steel down between the jaws of the welder when it rested on the fibre?

A. Not that I remember. Maybe I can cover it a little bit better by using my own language. What I remember about this machine is that we — it seems as though we laid the rings around on the bench, would go around this way, horizontally, and brought the points together; in fact that is pretty nearly all I remember about it.

Q. 17. Do you recall whether or not at first they got enough current to make good welds?

A. It seems as though at first they broke, that is the metal didn't unite, and at about that time I was grinding what you would call — where they pressed the iron together would leave kind of little ball on there and we would take them to the emery wheel and grind them down. At first there was quite a number of them would

break in the joint. I think afterwards though they got them so it would hold; they didn't have so much loss on them.

Q. 18. Do you recall any spot welding of metal sheets together with this machine?

A. I don't remember it.

Q. 19. Do you recall hearing of any at that time?

A. Not that I can bring back to mind now; in fact, all that I knew about it was the ring welding.

No cross-examination.

Deposition of Louis L. Little.

Louis L. Little, who was next called as a witness and being first duly sworn to tell the truth, the whole truth and nothing but the truth, deposes and says as follows: —

Direct Examination.

By Mr. Stackpole.

Q. 1. What is your name?

A. Louis L. Little.

Q. 2. Your age?

A. Fifty-one.

Q. 3. Occupation?

A. Machinist.

Q. 4. Where are you now employed?

A. Peerless Motor Car Company, Cleveland.

Q. 5. Where is your residence?

A. 6615 Belvidere Avenue, Cleveland.

Q. 6. Were you ever employed by the Warren Electric and Specialty Company?

A. Yes, sir.

Q. 7. About how many years ago?

A. About 1901.

Q. 8. Do you recall an electric welding machine that was used at the Warren Company for welding fan guard rings?

A. Yes, sir.

Q. 9. Did you do any work on that machine?

A. Yes, sir.

Q. 10. What was it?

A. Making the mechanical parts about clamping and holding the

fan guard in position. Also in locating, doing any mechanical parts they wanted made there, and getting the machine going.

Q. 11. Did you have anything to do with setting the machine up on the bench?

A. Not about setting up; I put the parts on after it was set on the bench.

Q. 12. I show you a photograph of a machine, Plaintiff's Exhibit 39. Do you recognize any parts of this device?

A. Yes, sir.

Q. 13. What parts?

A. The fastenings and the connections are made; looks about like it did when we assembled the machine.

Q. 14. Do you recall the angle irons on the machine?

A. I do not. The guard connections set back on the bench to the best of my recollection.

Q. 15. Was there any slot cut in the bench?

A. No, sir.

Q. 16. Was there any opportunity for insertion of fan blades or such like sheets of metal between the parts of the machine?

A. To the best of my recollection, there was no space to put anything there at all unless it was a very narrow piece.

Q. 17. What kind of welding was done?

A. Butt welding.

Q. 18. Any other kind of welding to your knowledge?

A. Never was used for any other purpose.

Q. 19. Did you ever hear of it being used for any other purpose?

A. Never heard of it being used for any other purpose.

Q. 20. When the machine was first set up did it operate successfully to make good butt welds?

A. No; had trouble with the rings breaking and pulling apart.

Q. 21. Have you ever spoken to Mr. McBerty about this machine?

A. Recalled to his mind that I had worked on the machine when it was constructed.

Q. 22. When did you speak to him about this?

A. I think that was five or six years ago.

Q. 23. Do you recall how the fan blades were fastened to the arms of the spiders?

A. They were all riveted on.

Cross Examination.

By Mr. PATTISON.

×-*Q.* 24. Your work as machinist at the Warren Electric and Specialty Company was in the machine shop, was it not?

A. Yes, sir.

×-*Q.* 25. And at the time the welding machine was made the machine shop was in a separate building from the fan shop, was it not?

A. I couldn't just tell you; it wasn't in the same room; I know we had to go from the machine shop into another room where the welder was set up.

×-*Q.* 26. And your work as machinist was in this separate room?

A. Not altogether. When I made parts for the welder I took them over and put them on the machine.

×-*Q.* 27. But I mean your general work.

A. General work was in the machine shop.

The signatures and certificates of both witnesses are waived by consent of counsel.

Deposition of George I. Spade.

GEORGE I. SPADE, being by me first duly sworn to tell the truth, the whole truth and nothing but the truth, deposes and says as follows: —

Direct Examination.

By Mr. STACKPOLE.

Q. 1. What is your name?

A. George I. Spade.

Q. 2. What is your age?

A. Forty.

Q. 3. Where is your residence?

A. 25 Roosevelt Avenue.

Q. 4. Warren?

A. Yes, sir.

Q. 5 What is your occupation?

A. Mail carrier.

Q. 6. Were you ever employed by the Warren Electric and Specialty Company of Warren, Ohio?

A. Yes, sir.

Q. 7. When?

A. In the spring of 1899 when I started in.

Q. 8. How long did you work there?

A. For at least three years anyhow.

Q. 9. Do you recall an electric welding machine that was used for welding the fan guard rings on desk fans?

A. Yes, sir.

Q. 10. Did you have anything to do with its making?

A. No, sir.

Q. 11. Did you see it in operation?

A. Yes, sir.

Q. 12. What was the nature of your employment?

A. First as an assembler, then I was in charge of the assembling department.

Q. 13. Assembler of what?

A. Motors.

Q. 14. Do you recall the setting up of this electric welding machine?

A. Not the setting up of it, but of seeing it after it was set up.

Q. 15. Did you see it in operation?

A. Yes, sir.

Q. 16. How frequently did you see it?

A. Well, I wouldn't say every day, but I was in the room working every day and would have to be in the same room with it.

Q. 17. I show you a photograph which is Plaintiff's Exhibit No. 39. Does this show the welding machine in question?

A. No, sir, not the machine.

Q. 18. In what respects is the photograph inaccurate?

A. Well, it sets out too far from the bench one thing, and of course this has electrodes when the other did not. The other machine set on a plate, its construction I can't say whether it was steel, wood or what it was, and this I think is bolted to the bench from the looks of it.

Q. 19. Did the welding machine have the angle irons shown in the photograph?

A. No, sir; I have no knowledge of it.

Q. 20. Was it possible to insert blades or steel pieces down between the welding devices as shown in that photograph?

A. Not unless it would have been a very narrow piece, say about one-half inch.

Q. 21. One-half inch deep you mean?

A. Yes, sir.

Q. 22. What kind of welding was done on the machine?

A. Butt welding.

Q. 23. Of what things?

A. Guard rings.

Q. 24. Did you ever see spot welding done on the machine?

A. Never.

Q. 25. Did you ever hear of it being done on the machine?

A. No, sir.

Q. 26. Have you talked about this machine with Mr. McBerty?

A. I have.

Q. 27. When?

A. About two years ago.

Q. 28. Have you talked about this machine with Mr. William E. Smith?

A. We have talked over the subject; yes, sir.

Q. 29. When was that?

A. Several times.

Q. 30. And have you talked about the machine with Mr. Pattison, who is now present?

A. Yes, sir.

Q. 31. When was that?

A. About two years ago at the same time I was talking to Mr. McBerty.

Q. 32. Do you recall the general construction of the cheap fans which were put out with the butt welding fan guard rings?

A. You mean the construction of the blade, or the construction of the whole machine, motor?

Q. 33. Well, do you remember the blades and spiders?

A. Yes, sir.

Q. 34. I show you a blade and spider that is now secured to a fan. Please state whether you recognize the construction of the blade and spider.

A. Yes, sir; I would say that is a reproduction of the original

blade and spider; the brass blades I believe had a straight brass piece up here [*indicating*] where this one is on a triangle.

Q. 35. In this cheap type of fan how were the blades fastened to the spider?

A. Riveted.

Q. 36. About how many rivets?

A. Three rivets.

Q. 37. Arranged as in this example?

A. Yes, sir.

(Plaintiff's counsel offers in evidence the spider and blades riveted thereto and asks that the same be marked "Plaintiff's Exhibit No. 40, Steel Spider and Blades Identified by Mr. Spade".)

Q. 38. Do you recall whether the bench on which this welder was mounted was slotted or cut?

A. No, sir, it was not.

Q. 39. Do you recognize the rest of this apparatus here?

A. Yes, sir.

Q. 40. What is it?

A. It is a direct current motor.

Q. 41. Made by whom?

A. Peerless Electric Company.

Q. 42. Was the Peerless Electric Company the one that was the successor of the Warren Electric and Specialty Company?

A. To the best of my knowledge and belief.

(Plaintiff's counsel offers in evidence the fan on which Exhibit No. 40 is mounted, and the same is marked "Plaintiff's Exhibit No. 41, Fan made by Peerless Electric Company".)

Cross Examination.

By Mr. PATTISON.

×-*Q.* 43. Mr. Spade, I show you a photograph of a page from the 1901 catalogue of the Warren Electric and Specialty Company, "Plaintiff's Exhibit No. 38", and call your attention to the fact that that shows the "G" type of fan and I notice that this appears to be a differently constructed fan. Is not that right?

A. I believe, if I remember right, the G type was a cheaper fan. This motor is not a G type. The motor part, understand.

×-*Q.* 44. How is the standard?

A. You are going back eighteen years ago and more.

×-*Q.* 45. You see this don't have any swivel in it; it is rigid?

A. This is a different motor here than the G type.

×-*Q.* 46. And it is a different standard?

A. Yes, sir.

×-*Q.* 47. That is, the standard of the G type as shown in the catalogue is different from that shown in this Exhibit 41?

A. Yes, sir, it was a cheaper fan; it was got out to be a cheaper fan than this one.

×-*Q.* 48. This fan Exhibit 40 and 41 was made after that shown on this page of the catalogue?

A. I believe I differ. I believe it was made before.

×-*Q.* 49. You think that that Exhibit 40 and 41 was made before the G type fan on this page of the catalogue, Plaintiff's Exhibit No. 38?

A. You are combining this blade with this fan. There are two different exhibits there altogether and you are getting me to talk about both of them. This is a G type blade and this is a different motor.

×-*Q.* 50. Was that motor made before or after G type on this catalogue?

A. To the best of my knowledge, it was made before.

×-*Q.* 51. Do you know where this fan blade came from?

A. No, sir.

×-*Q.* 52. Will you please examine carefully the spider of this fan and state whether it is brass or steel?

A. I would say it was a bronze spider for my part.

×-*Q.* 53. The brass spiders were not used in the G-2 type of fan, were they?

A. No, sir.

×-*Q.* 54. The spiders of that type G-2 fan were made of steel, were they not?

A. Of steel; yes, sir.

The signature and certificate of this witness is hereby waived by consent of counsel.

Adjourned to the office of Messrs. Carpenter, Stevenson, Betzel-Bacchus, Ford Building, Detroit, Michigan, Monday, July 14, 10.30 A. M.

Depositions on behalf of plaintiff taken under the Equity Rules of the Circuit Court of the United States and the Revised Statutes, before me,

C. A. STICKLE,
Notary Public and Special Examiner.

DETROIT, MICH., July 14, 1919, at 10.30 A. M.

Met pursuant to adjournment.

Present: J. L. STACKPOLE, Esq., Counsel for Plaintiff;
A. S. PATTISON, Esq., Counsel for Defendant.

Fourth Deposition of James H. Gravell.

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Are you the same James H. Gravell who has already testified in this case?

A. Yes.

Q. 2. Have you read and do you understand the British patent to Ferranti, No. 11,921 of 1903?

A. Yes.

Q. 2. Please state whether you find the process of spot welding set forth in the Harmatta patent in suit described in the provisional specification of this deFerranti British patent.

A. The process set forth by Harmatta is not anywhere disclosed in deFerranti's provisional specification. DeFerranti describes a number of ways of solving the problem of butt welding the end of a turbine blade to a carrying disc. This condition required the welding of a large surface to a small surface by butt welding the two surfaces together. Owing to the fact that the thermal characteristics of the two parts of the work to be united varied greatly, the heat generated at and near the abutting surfaces was conducted away much more rapidly by the large disc than by the small blade, with the consequence that the disc remained practically cool and would not attain the sufficient heat to create the weld. According to the words of the inventor:

"The invention, therefore, consists broadly in adjusting the volume of the disc in the neighborhood of the welding point so that approximately an equal heating occurs in both faces to be welded.'

The inventor then goes on to describe how he will adjust the volume of the metal in the disc. One of the modifications consists in cutting grooves across the edge of the disc or ring; another modification consists in running grooves circumferentially around the disc, or in cutting a number of grooves running in different directions across the edge of the disc. Still other modifications are suggested by the inventor. Radial holes may be bored a short distance into the edge, or holes may be bored near the edge of the disc from one face through to the other face. Still another modification is suggested. The disc may be made laminated so as to produce the same general shape of surface as produced by the circumferentially formed groove in the face of the solid disc.

In the case of cutting the groove entirely across the edge of the disc, the metal of the disc is isolated so as to form projecting portions corresponding to the abutting end of the turbine blade. This method was fairly well understood even at the time of Ferranti's application, and had been used prior to that time by myself. This suggestion of cutting the grooves across the edge of the disc made the problem one of simple butt welding, and practically made the two abutting surfaces of the same thermal characteristics. The idea of the circumferentially cut grooves produced what is now called a cross-wire welding; that is, the length of the blade surface would cross at right angles the length of the disc edge surface. This modification is a form of butt welding of which it possesses the general characteristics. There is a burr formed, and in welding one part of the work is forcibly pushed into the other part of the work. The idea of drilling radial holes in the edge of the disc so modified the disc that, according to the inventor, a more satisfactory butt welding condition could be obtained. In some cases these holes follow the general pattern of the end of the blade so that the actual effect produced was very similar to running grooves across the edge from face to face and produced projections corresponding, in a fashion, to the projecting end of the turbine blade. This same idea was practically produced when the holes were bored through the disc from face to face near the edge.

The idea of running grooves across the edge of the disc from face to face obliquely, and then running another set of grooves obliquely in the other direction so that they would cross the first set of

grooves was another modification suggested by the inventor. This produced practically the same effect as cutting two grooves across the edge of the plate so as to isolate a projecting portion. It had, however, an advantage over the two-groove cuts and can be realized when we consider the shape of the turbine blade. Looking at the end of a turbine blade, it is crescent shaped. It is clear that it would be a very expensive operation to cut crescent-shaped grooves across the face of a turbine disc so that the projecting portion of the disc would exactly correspond to the projecting portion of the blade. By utilizing crossing grooves we can attain a crescent-shaped projection practically corresponding to the crescent shape of the blade; that is, there will be a number of closely related and located projections all contacting with the end of a blade. All the projections which contact with the end of the blade become practically one large projection, electrically and thermally considered, but those projections which do not contact with the blade play no part in the thermal conductivity. In order to produce this effect mentioned by Ferranti, these grooves would necessarily be very narrow, for if they were wide, it would reverse the condition desired by Ferranti, that is, two surfaces of equal thermal characteristics. Ferranti tells us that the proposition of welding a turbine blade to a disc will not work because the two surfaces differ in thermal characteristics; that is, one is a large surface and the other is a small surface. Now, if the grooves are wide, we have slender projections in relation to a big blade, and consequently, according to Ferranti's ideas, no weld would occur. In making the weld with the crossing grooves there is no change in Ferrrnti's method of operation. It is still a plain, simple butt-welding operation in which there is a burr formed, and in which one part approaches the other during the operation.

We must bear in mind that in all of Ferranti's modifications the same general process of welding is carried out; that is, the parts are held in clamps and the current passed from one part to the other, and when the temperature has sufficiently risen the two parts are forcibly pressed together.

In none of these modifications described by Ferranti is there any suggestion of Harmatta's process, where the product is two bodies united by isolated welds or welds surrounded by unwelded areas.

Q. 4. Please compare the showing of the deFerranti complete specification with the process of the Harmatta patent.

A. In the complete Ferranti specification the modifications suggested by Ferranti in his provisional specification have been more completely described, and sketches are made illustrating the various suggestions he originally made in his provisional specification. Most of these illustrations are such as a man skilled in the art at the time of Ferranti's provisional specification would expect to find them. Figure 2, however, is to my mind an exception. In figure No. 2 of the complete specification Ferranti shows grooves which are very wide, producing a number of very slender projections, so that each projection considered by itself is of tremendously different thermal characteristics than the blade to which it is supposed to weld, and according to Ferranti's own description no weld would happen owing to the great difference in thermal characteristics. I have, myself, experimented with the condition which I would imagine Ferranti meant in his provisional specification, and I found that when the grooves were narrow a single weld was produced across the whole end of the turbine blade, and this weld was reasonably strong. In fact, the blade could be bent without separating it from the surface, but when I endeavored to make welds with spacings great between the projections it was with great difficulty that I secured welds, and even after securing the welds the blades could be separated from the disk by a sharp blow.

Mr. Pattison. The testimony of the witness relating to his experiments above described is objected to because the experiments were not carried on in the presence of the defendant's counsel.

A. In carrying out the experiments the blades were gripped in copper clamps, as likewise were the discs, and the operation was a true butt-welding one. A burr was formed and one part approached the other in the operation. When the grooves are made so that a strong weld is produced, there is a decided tendency for the conducting projections to mushroom and arch from one to the other under the abutting surface of the blade, due to the pressure applied to the softened metal. It is not likely Figure 2 would be, if carried out, exactly as depicted, conducive to practical results, for the amount of area welded would be very small in comparison with a cross-section of the blade. It should be noted that the surface is

much smaller than a casual observation would indicate, for in no case is the entire surface of any one of the projections in contact with the blade, and comparing this with Harmatta's process, even supposing that each projection as indicated in Figure 2 were welded to the blade, in no case would there be an isolated weld surrounded by an unwelded area in the meeting surfaces.

(Adjournment to the office of the Clerk of the United States Court.)

Q. 5. Please examine the 1901 catalogue of the Warren Electric and Specialty Company, Defendant's Exhibit No. 2, and state which, if any, of the pictures of the desk fans illustrated therein show rivet heads on the backs of the spiders or centres.

Mr. PATTISON. The question is objected to because the catalogue is the best evidence of the subject-matter of the inquiry.

A. The fan labeled A-4 shows a rivet on the back of the spider, and G-2 shows a rivet on the back of the spider.

Q. 6. Where does the rivet on the back of the spider in the G-2 blade appear in the cut?

A. It appears on the lower blade on the right-hand side facing the cut, directly above where the small central ring of the guard intersects the right-hand edge of the lower blade.

Q. 7. Will you take "Plaintiff's Exhibit No. 40, Spider and Blade Riveted Thereto", and see whether by holding it in the proper position, as shown in the G-2 fan, the rivet head on the back of the spider is visible as shown in the cut of the G-2 fan?

A. Yes; by holding this exhibit in the position occupied by the spider and fans in cut G-2, a rivet on the back of the spider is visible. This rivet occupies the same relative position as the visible rivet in the cut G-2.

Q. 8. How about the rivet shown on the back of the spider in the cut of the A-4 fan? On which blade is that?

A. The visible rivet is on the left-hand edge of the top blade.

Q. 9. And holding the "Plaintiff's Exhibit 40" in the position of the spider and blades shown in cut A-4, can you see the same rivet head?

A. Yes.

Q. 10. Now, examine this 1901 catalogue and state which of the

cuts of the desk fans show the rivet heads so positioned as to be arranged in triangular relation to one another.

A. The following cuts show triangularly arranged rivets, that is, three rivets: cut A-1, A-2, A-3, A-4, E-2, G-1, G-2.

Q. 11. The triangular arrangement of the rivets would indicate what shape of the arm of the spider?

A. A shape very similar to that contained on the fan of "Plaintiff's Exhibit No. 40"; that is, petal-shaped arms on the spiders.

Q. 12. I show you specimen attached to the affidavit of Mr. Lipps, "Plaintiff's Exhibit No. 30", which specimen is marked "Lipps' Exhibit H". Please state whether or not this "Lipps Exhibit H" is spot welded.

A. I would say that this was stuck and not spot welded in the true sense of the term. I say this because I note that the weld at one of the flat edges, although it appears to have been heated more than the other welds, does not seem to have been heated enough because I note that the metal has parted at this weld, and if this weld is only a stick, there is every reason to suppose that all the rest of the welds are only sticks. Therefore, I would not consider this sample really spot welded.

Q. 13. What is the difference between a "stick" and a spot weld?

A. In a stick the metal may be united by a partial fusing of the oxides or a semi-cohesion. In a weld the metal has been brought up to a high temperature and the actual metallic surfaces have intermingled.

Q. 14. I show you McBerty's Exhibit O, attached to McBerty's affidavit, "Plaintiff's Exhibit No. 28". Please state whether the blade of this exhibit is steel or not; and, if so, if it has been treated in any way.

A. Both the blade and section of spider attached thereto are of steel. The blade at one period of its existence has been copper-plated. This is evidenced throughout the surface of the blade, but particularly at one point along the left-hand edge of the back of the blade when the spider is held downwardly. The copper-plating of the blade has been blued.

Q. 15. Can you tell whether or not the blade has been welded to the piece of spider arm before or after the spider arm was cut?

A. Yes, that is very easily told, because I note that the cut

surface of the spider arm is blued. This is evidently caused by the heat soaking back from the spot which has been heated for welding. Had the spider arm been welded to the blade prior to cutting, this surface could not possibly have shown any bluing.

Q. 16. Please give the reasons for this last statement.

A. Metal is blued by oxidizing in the air, and had the blade been welded first and then cut, this surface would not have been exposed to the air while heated to a bluing temperature.

Q. 17. Please examine the blade around the rivet holes and state if you find any indication of the blade once having been riveted.

A. I note concentric marks around the two rivet holes, which indicates clearly that the blade was once riveted and the rivets removed.

Q. 18. Do you find such marks on the spider arm?

A. No, I do not.

Q. 19. Please examine the other specimen attached to McBerty's affidavit, known as McBerty's Exhibit P. Can you tell whether this piece of metal was welded to the piece of spider arm before or after the spider arm was cut?

A. The end of this spider arm also shows bluing, which would indicate that the welding was done after the portion of spider arm had been detached from the main spider.

Q. 20. I show you "Defendant's Exhibit M". What is the metal of the blade of this exhibit, and how has it been treated, if at all?

A. The blade of this exhibit is of steel. It has been copper-plated and then nickel-plated. The coppering shows through the nickel near the top cut edge of the face of the blade, and I note a scratch near the top edge which shows copper beneath the nickel surface.

Q. 21. During your handling of this exhibit in the trial of the case in court, did you scratch it at all?

A. Positively not. I was extremely careful in handling the sample because I was present at the trial when there was some criticism about scratching the sample, and this made me doubly careful.

Q. 22. Does the blade portion of "Defendant's Exhibit M" show signs of rivets around the rivet holes? *A.* Yes, both the

rivet holes have concentric marks, which surely indicate the presence of rivets at one period of its existence.

Q. 23. Does the spider arm of this exhibit show corresponding rivet marks around the holes?

A. No, it does not.

Q. 24. A part of the spider arm of this "Exhibit M" shows bright. How may that be accounted for?

A. It can be accounted for by buffing.

Q. 25. Is there any indication of when this buffing was done?

A. The metal of the spider has not rusted, which, therefore, would indicate that the buffing was done fairly recently.

Q. 26. I show you "Defendant's Exhibit 56", which was the sample welded by Mr. McBerty on the welding device at the Ford plant when we witnessed the operation of that device. Do you observe anything peculiar about the spot welds in this exhibit; and, if so, what?

A. Many of the spot welds in this exhibit indicate that the welding electrodes were not perpendicularly placed to the general plane surface of each blade. This recalls to my mind the actual operation of the McBerty machine at the Ford plant, where I noted that the electrodes in some cases could not be placed perpendicularly to the surface owing to the small gap of the McBerty machine. I remember remarking about this at the time.

Q. 27. What is the effect of the electrodes when operated in positions oblique to the work?

A. This is shown very nicely by the blade with the two file marks scratched on the edge. The tip of the tool has a tendency to run obliquely into the metal. The tip of the tool is indicated by the rust marks in the centre of the heated places, and it will be observed that these rust marks are to one side instead of being exactly centrally located. There is also a tendency to throw a slight raise to one side of the heated spot.

Q. 28. Please compare the spot welds of "Defendant's Exhibit No. 56" in the respects you have just mentioned with the welds in McBerty's affidavit Exhibits O and P, and in "Defendant's Exhibit M".

A. In Exhibit O attached to McBerty's affidavit the welds indicate that the welding electrodes were perpendicularly arranged to

the surface. This is also the case in "Defendant's Exhibit M", and also the case in Exhibit O attached to McBerty's affidavit, and again the case in Exhibit P attached to McBerty's affidavit.

Q. 29. What would this difference in the arrangement of the electrodes with relation to the work indicate?

A. It would indicate that the sections of spider were cut apart from the main spider before welding to the individual blades.

Q. 20. In view of the condition of the exhibits, namely, Exhibits O and P attached to McBerty's affidavit and "Defendant's Exhibit M", were these different samples cut from a spider after the blades had been welded to it?

A. No; this would have been impossible, for two reasons; one is that the welding tools were perpendicularly placed to the surface when the blade was welded, and this would have been impossible in McBerty's machine owing to the limited gap. Then, too, the cut sections of the spiders show blue marks produced by the welding heat. These blue marks could not have occurred had the spider been welded intact and then cut.

Cross Examination.

By Mr. PATTISON.

×-*Q.* 31. Referring to "Defendant's Exhibit M", the blue mark on the spider caused by the welding heat does not extend inward beyond the inner hole of that arm, and I am unable to find any blue mark on the cut part of this spider. Where do you find it?

A. I fail to find it. If you understood that my remarks referred to the bluing on this sample, you are incorrect, because I have never seen any blue marks on this sample. I may have put them together collectively and analyzed the thing, but it was wrong.

×-*Q.* 32. Who put the file marks on the blade in "Plaintiff's Exhibit 56"?

A. I think I was present when these file marks were put in it and I think it was at the Ford plant. My recollection is rather hazy about this, but I believe Mr. McBerty is the one who did it so that this particular fan could be identified.

×-*Q.* 33. Do you know who broke apart the weld in the Lipps Exhibit H attached to his affidavit, on one edge of that exhibit as now appears?

A. No, I do not.

×-*Q.* 34. The sectional spider part of Exhibit O attached to McBerty's affidavit appears to me to be blued all over its surface. Do you agree with me?

A. Yes.

×-*Q.* 35. The blade part of this same exhibit appears to be blue all over its surface. Do you agree with me on this?

A. Well, I understood you to say blade before when you meant spider.

×-*Q.* 36. I meant spider.

A. I agree about the blade.

×-*Q.* 37. What makes you think that "Defendant's Exhibit M" has been nickel-plated?

A. The general character of the surface; also the fact that it has a bright, metallic surface placed on top of a copper surface. It is the usual practice in nickel-plating to first copper-plate and then nickel-plate. The nickel adheres much better to an article if it has first been copper-plated before nickeling. Another reason for supposing this to be nickeled is that under a glass the cut edge of this blade shows signs of rust, whereas the plane surface of the blade seems to be free from rust.

×-*Q.* 38. Did you say that the blade in the Exhibit O attached to the McBerty affidavit had been blued by the heat from the welding of the spider to it?

A. No, the bluing has not been caused by the welding of the spider to it. This bluing is a regular commercial process on top of copper to give a peculiar oxidized effect. That is the blade we are talking about. The bluing in the arm is a heating effect, whereas the bluing in the blade is a chemical effect.

(It is understood that further cross-examination by Mr. Pattison might be made at the office of Messrs. Stevenson, Carpenter, Butzel & Backus.)

Redirect Examination.

By Mr. STACKPOLE.

RDQ. 29. In the Exhibit O attached to McBerty's affidavit and in the "Defendant's Exhibit M", are both the blade and the spider arm punched with two rivet holes?

A. Yes. "Defendant's Exhibit M" has the portion of the spider arm attached to the blade punched with two rivet holes, and the blade attached to this spider arm is punched with two rivet holes. In Exhibit O attached to McBerty's affidavit the portion of spider arm is punched with two rivet holes, and the attached blade is punched with two rivet holes.

RDQ. 40. How about the spider arm forming part of Exhibit P attached to McBerty's affidavit?

A. The spider arm is shorter than the two we have just been talking about, but at the extreme end of this spider arm the location of the hole is indicated, showing that this portion of the spider arm has also been punched for two rivets; that is, two rivet holes have been provided.

Adjourned to the office of Messrs. Stevenson, Carpenter, Butzel & Backus.

Cross Examination.

By Mr. PATTISON.

R×-Q. 41. Have you testified in this cause heretofore in respect to the disclosure of the Ferranti provisional and complete specifications?

A. I understand by "this cause" you mean *Thomson* v. *Ford* case, and I answer no.

R×-Q. 42. Have you testified in regard to this same subject-matter in any other controversy?

A. Yes.

R×-Q. 43. What was the controversy?

A. I believe it was in an interference case in the Patent Office between Ferranti and Harmatta.

R×-Q. 44. Is your present deposition any different from what you stated in the interference?

A. I have very little recollection of my deposition at the present time. I have every reason to suppose the substance of my remarks is identical.

Signature of witness and certificates waved by consent of counsel.

Adjournment until 1.45 P. M.

Deposition of Frank C. Wagner.

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Please state your name, residence and occupation.

A. Frank C. Wagner; age, fifty-five years; residence, Terre Haute, Indiana; occupation, professor of mechanical and electrical engineering at Rose Polytechnic Institute.

Q. 2. What are your qualifications which enable you to testify as an expert in this case?

A. I pursued a course in mechanical engineering at the University of Michigan, graduating in 1885. From 1886 to 1889 I was in the employ of the Thomson-Houston Electric Company of Lynn, Mass., engaged in erecting electrical machinery. From 1890 to 1896, I was assistant professor of mechanical engineering at the University of Michigan. From 1896 to the present time, I have taught at the Rose Polytechnic Institute, where for a number of years I have held the position of professor of mechanical and electrical engineering. During all the time that I have been teaching I have also done work as a consulting engineer in both mechanical and electrical engineering lines, and have also testified as an expert in numerous suits involving interpretation of patents. A considerable number of these patent cases have involved the art of heating in boiler furnaces and metallurgical furnaces. I am a member of the American Society of Mechanical Engineers; an associate member of the American Institute of Electrical Engineers; a fellow of the American Association for the Advancement of Science; a member and trustee of the Indiana Engineering Society.

Q. 3. Have you read and do you understand the various patents that have been referred to by Messrs. Gravell and Dyer in this case, and have you read the depositions of Messrs. Gravell, Dyer and Thomson?

A. I have read the prior patents referred to in the question and believe that I understand them. I have also read the depositions of Mr. Gravell, Mr. Dyer and Professor Thomson which have been given in this case.

Q. 4. Will you explain the development of the art prior to the application date of Harmatta in suit as set forth in the prior patents

referred to, and compare that art with the subject-matter of the Harmatta patent?

A. The Harmatta patent in suit relates to the art of electric welding. This art originated with Professor Elihu Thomson in 1886. It was my privilege to hear Professor Thomson's first public lecture upon this new art in the fall of 1886 in Boston.

Welding as practiced prior to the introduction of electric welding was the art of joining pieces of metal together by first raising the portions to be welded to a high temperature and then bringing the two pieces into contact and hammering or pressing the hot metal so as to unite the two parts into a single homogeneous piece.

Not all metals are susceptible of welding according to the old art of the blacksmith. Iron and steel were the only metals commonly welded prior to the introduction of electric welding. It is a characteristic of iron that as it approaches the melting point it becomes soft and somewhat plastic, whereas some of the other metals pass so quickly from the solid to the liquid state that they cannot be worked with in a plastic condition.

It is possible to join metals together or to add additional metal by actual fusion. I do not consider this, however, as a true welding operation. I consider that in welding the heating stops short of actual fusion and that the metal is joined by hammering or pressing the pieces together without actually melting the parts so joined.

I make this explanation in view of the fact that a method of joining metals by fusion, the fusion being obtained by electric heating, as in the case of so-called arc welding, has grown up and is in extended use.

Another method of uniting two pieces of the same kind or of different kinds of metal is by the soldering operation. In this, the joining metal is one which melts at a lower temperature than either of the metals to be joined. The proper method of making a good solder joint is to raise the temperature of both of the bodies to be joined up to the melting point of the solder and maintain a uniform heating at such temperature until the solder flows and unites with the two pieces to be joined. I refer to the soldering operation because several of the patents in this prior art relate to soldering.

In the art of welding iron and steel as practiced prior to the introduction of electric welding, the metal was heated from an external

source, that is, external to the iron or steel pieces that were to be welded. This was commonly done in a blacksmith's forge, or in heating furnaces, using coal, gas or oil for fuel. Owing to the fact that the heat was developed outside of the metal and was transferred to the metal by conduction and radiation from outside sources, the outer surface or skin of the metal would ordinarily be the hottest portion.

In the art of electric welding introduced by Professor Thomson and described in patents No. 347,140 and 347,141, an entirely different method of heating the metal was used. It has been known for a great many years that when an electrical current is passed through a metallic body, heat is developed because of a resistance to the flow of the current. Professor Thomson made use of this property and by passing enormous currents through the metal succeeded in raising the metal to a temperature high enough to permit a welding. By this method the heat is developed within the body of the metal and does not need to be transmitted to the metal from some external source.

The Thomson method of electric welding was particularly adapted to producing what is commonly known as a butt weld. Two pieces of an iron bar may be joined together, and were commonly so joined by blacksmiths, either by placing the heated ends in contact and driving the bars together, or by lapping the end of one bar a certain distance over the end of the other bar after these parts had been raised to a welding temperature and hammering the two pieces together by transverse blows. The former method was called butt welding and the latter method was called lap welding.

To make a butt weld by the Thomson electric welding process, as for instance with two round bars which were to be welded end to end, two heavy clamping heads were provided which were electrically insulated from one another and which could be moved to and from each other. The bars to be welded were firmly clamped in the two heads respectively, with the ends to be welded facing each other. The clamps were respectively connected to the terminals of some source of electrical current, either a generator of large current capacity and low voltage, or an alternating current transformer built to furnish heavy current at low voltage. With the source of current connected to the clamping heads and the rods out

of contact, no current will flow, because the clamps are electrically insulated from each other. If the rods are now caused to approach each other, the moment the ends make contact an electrical current will flow and heat will be generated in consequence. The greatest amount of heat will be generated where the electrical resistance is greatest, which will be at the point of contact between the two rods. Hence, the ends of the rods will be heated most rapidly. Owing to the fact that the electrical resistance of metals increases greatly as the temperature rises, the ends of the rods, having started to heat before the other portion of the rods, will continue to heat more rapidly, with the result that the ends of the rods facing each other will be raised to a welding temperature before the metal at a distance from the ends has become hot enough to lose its strength and rigidity. Consequently, when the clamping heads are moved toward each other and a certain definite pressure is maintained tending to force them together, the ends of the rods will be forced together as soon as a welding temperature is reached, the metal back from the ends being sufficiently rigid to exert a pressure comparable to the force due to the impact of the blacksmith's hammer.

It appears then that the Thomson electric welding process was a true welding operation in which both heat and pressure were utilized to effect the joining. Professor Thomson says in his specifications, page 1, lines 30 to 33: "Briefly, the new art, which I term 'electric welding', consists in bringing together with a certain pressure the ends of the wires, bars, etc., to be jointed."

With this general introduction, I will now consider the patents of the prior art in chronological order with a view of tracing the actual historical development.

Patent to Benardos and Olszewski, No. 363,320, dated May 17, 1887, describes the process of arc welding. At the date of this patent, 1887, electric arc lights were very extensively used, and it was well known that if two conductors of electricity connected to an electric circuit were touched together so as to establish a flow of current, and then separated a slight amount, the current would continue to flow from one conductor to the other, being carried by a vapor stream of particles passing between the conductors. It was well known that the temperature of the electric arc was very high. Benardos utilizes the electric arc as a source of heat for fusing

metal locally. The Benardos process was distinguished from the Thomson process in a number of ways.

First, the heat is developed exteriorly to the piece worked upon and not within the substance of the piece itself. So far as the method of supplying heat is concerned, arc welding, so called, is practically the same as acetylene welding.

Second, in the Benardos process the union takes place by fusion, and not by simultaneous application of heat and pressure, as in the Thomson electric welding.

Third, the mechanical manipulation is entirely different. In Benardos the electrodes are first brought together and then separated. In Thomson the electrodes are continuously pressed together.

I consider that the so-called arc welding, as illustrated by the Benardos and Olszewski patents, and the Thomson process of electric welding are two different branches of the art of electrical heating for welding purposes. Each has had its own line of development, and each is in extended use at the present time. The Harmatta patent in suit belongs in the line of development from the Thomson method of electric welding, and I consider that patents relating to so-called arc welding belong to an entirely different branch of the electrical heating art.

Thomson patent No. 396,015, dated January 8, 1889, is for a method of electric riveting. This patent belongs in the line of development from the original Thomson patent in that the heating is done within the body of the metal which is being worked upon. In this patent the object aimed at is to heat the rivet sufficiently to permit the ends being upset and formed into heads. The heat is generated by passing an electrical current longitudinally through the rivet. After the proper temperature has been reached, the same heads which served to convey the current to and from the rivet are used to form the rivet heads by being forced together with a sufficiently great pressure. In the specification the inventor states that sometimes the body of the rivet is welded to the plates so that for a certain distance both plates and the body of the rivet become a continuous piece of metal. This result is incidental, and arises from the fact that since the heating of the rivet takes place throughout the entire body of the rivet, and the ends of the rivet lose heat

by radiation and conduction to the electrodes, while the body of the rivet is surrounded by the plates and the heat can escape only by conducting into them, the body of the rivet reaches a welding temperature by the time the heads are hot enough to be swaged over.

The action just described is assisted by the clamps shown in Figure 10 of the patent when these clamps are not insulated electrically from the plates. In this case a certain amount of current will flow through the plate from one clamp to the other, and by generating heat will diminish the flow of heat by conduction from the body of the rivet to the plates. I do not find in this patent any intimation that welding takes place in any other way than by the heat conducted from the body of the rivet to the adjacent portions of the plates.

The Coffin patent, No. 437,571, shows a method of electrical welding in which the heat is developed partly by poorly conducting electrodes, partly by heat generated in the material to be welded. Instead of passing the current from one bar to the other across the joint which is to be butt welded, Coffin provides an electrode of carbon movable vertically and a similar block of carbon not connected to the source of electrical current. The ends of the pieces to be welded are placed between these carbon blocks and one or both of the pieces so connected electrically that the current flows through one carbon block into and through either one or both of the pieces worked upon. Heat is developed at the points of contact between the rod and the carbon and in the carbon itself and transferred by conduction and radiation, which includes the lower carbon block through which electricity does not flow, until the ends of the rods are raised to sufficient temperature to permit of welding. Then the rods are forced together by suitable mechanism to make a butt weld. The principal source of heating in the Coffin method seems to be in the carbon blocks and not heat generated in the body of the metal being welded. In Figure 4, for instance, the electrical current does not pass at all through one of the rods. If a considerable portion of the heat developed were due to the electrical resistance of the rod itself, then the right-hand rod in this figure, which is traversed by the electric current, would reach a welding temperature long before the left-hand rod which is not traversed by

the electric current. Coffin's invention appears to be an attempt to secure a true welding operation by electrical heating and simultaneous pressure, the heat being generated not in the body of the metals being welded, but exteriorly by electrical means.

A year earlier than the Coffin patent is the German patent to Benardos, No. 50,909, dated May 8, 1889, and published February 19, 1890. This patent is for a device quite similar to the Coffin device, and makes use of a heating element consisting of a poor conductor of electricity just as in Coffin. The inventor distinctly says that his process is clearly distinguished from the prior Benardos process which uses the electric arc, and also from the electric welding process of Elihu Thomson. This process as well as the Coffin process might be termed the resistor method of heating. The heat is developed in a poorly conducting body exteriorly to the piece being worked upon and transferred by conduction and radiation to the work. Benardos shows, in Figures 1, 2, 3 and 6, what is practically an electrical soldering iron and is so described. In Figures 4 and 5 he shows a device for butt welding rods in which the resistors practically constitute an electrical furnace and in which the arrangement is very similar to that of Coffin.

The next patent in order is Thomson's patent No. 444,928, January 20, 1891. This patent is for a method of lap welding, and is along the line of development from the original Thomson patent. As illustrated in Figure 1 of this patent, when it is desired to join two sheets of metal the edges are lapped a certain amount and the lapped portions passed between a pair of rolls, the individual rolls of which are electrically insulated from each other and connected to the terminals of a source of electrical current. One of these rolls can be moved toward the other and a pressure exerted between the two.

With the plates overlapping each other, placed between the rolls, and the current flowing from one roller to the other across the contact surface of the overlapping plates, heat is developed, and as the plates are passed through the rolls the combination of pressure and heating welds together the overlapping portions. The amount of heat developed is determined by the amount of overlapping, and the entire opposed surfaces are welded together.

Both lap welding and butt welding were common practices in the

blacksmith art. Just as in the original Thomson patent, Profess Thomson accomplished butt welding by developing heat in t metals to be welded and at their points of contact, so in this lat patent he accomplished lap welding in a similar manner. In bo cases the heat was developed in the work itself and not exteriorl

Blanchard patent No. 466,266, dated December 29, 1891, is f an electric heating tool to be used for heating rivets. In th device the electrical current is passed through the rivet transversel raising it to the required temperature. So far as the heating concerned, the rivet is heated by the electrical current within its in a manner similar to that in the Thomson riveting patent. welding is involved.

Thomson patent No. 496,019, dated April 25, 1893, is for s dering device. In this patent Professor Thomson departs from t idea of his original patent, which was to develop the heat requir in the metal that was being worked, or at the point of juncti between pieces to be joined. He purposely introduces electri resistance exteriorly to the pieces worked upon. This gives method of heating well adapted to the soldering operation, in th it causes the plates which are to be united by the solder to be least as hot as the melting point of the solder itself, which is necessary condition for good soldering. In this respect solderi differs from welding. In welding it is desirable that the points contact where the weld takes place should be hotter than adjac portions of the pieces being joined.

Professor Thomson says, on page 1, lines 44 to 56:—

"My invention comprises further an improvement in elec soldering, consisting essentially in establishing an electric resista to the passage of the current from the clamp or pressure block b of the joint to the metal or the work to be joined. This may done either by modifying the surface of the pressure block its or by modifying the surface on which it bears, or both, or by interposition of a thin septum, layer, or zone or resisting mater or material modified in condition or form so as to oppose a res ance to the passage of an electric current."

British patent to Parkinson and Gatwood, No. 14,536, accep July 27, 1895, shows a device for filling in the corners between spokes and rim of a wheel with molten metal and welding it

adjacent parts. The device is quite complicated and consists essentially in providing a mold in sections to be brought together by an hydraulic plunger, and in passing heavy electrical currents through the metal to be heated, so as to bring the metal to a welding heat, and then by the action of the plungers compress the metal into the corners between the spokes and the rim. The operation is described as glutting. This patent is along the line of development started by Professor Thomson, in which the heating is developed by the electrical resistance of the metal being worked upon.

Patent to Lemp No. 531,197, dated December 18, 1894, is for a method of locally annealing steel plates. This patent also is along the line of Professor Thomson's original idea of developing heat by the electrical resistance of the metal being worked upon. It is not, however, a welding operation, the purpose being simply to heat a hardened steel plate locally so as to anneal only a limited portion, leaving the remaining portion hardened. The temperature required for annealing is much lower than the welding temperature.

In one form of the device the two electrodes leading the current to and from the steel plate are placed a short distance apart, and both in contact with the same surface of the plate. The electrical current passing from one electrode to the other through the metal of the plate heats the plate locally. If it is desired to anneal the plate through its entire thickness, as when, for example, it is required to drill a hole through the plate, then the electrodes are placed on opposite sides of the plate, so that the current flows through the plate from one side to the other.

Adjourned to 9 o'clock, July 15, 1919.

DETROIT, MICH., July 15, 1919.

Met pursuant to adjournment. Counsel present as before.

Answer to Q. 4 continued:

Lemp patent No. 553,923, dated February 4, 1896, is for an improvement on the Thomson roller welding patent No. 444,928, and aims to correct deficiencies in properly heating the metal in the prior Thomson device. The invention of Lemp related to providing additional heating means. Where a long strip or seam was to be welded, Lemp provides for sending electrical current through the metal plate longitudinally of the strip or seam, in addition to the transverse currents which were used in the earlier Thomson

process. The general position of this Lemp patent in the art is the same as that of the Thomson roller welding patent. It makes use of the principles of the original Thomson fundamental patent on electric welding, in that the heat is developed within the material worked upon.

Robinson's patent No. 574,942, dated January 12, 1897, is for a rail joint said by the inventor to be adapted to the electric welding process. The general idea of the Robinson invention is to provide projections on girder plates and fish plates and to weld these projections to the rail, those upon the girder plate to the bottom of the rail, and those upon the fish plate to the web of the rail. He does not describe any apparatus for accomplishing these welding operations. He apparently considers the operation to be a simple case of butt welding of the projections provided to the rail, and that the apparatus to be employed would be such as is commonly used for butt welding.

Patent to Kleinschmidt No. 616,436, dated December 20, 1898, is for a device for welding splice bars to rails to make a continuous railway track. Two splice bars are used, placed on opposite sides of the web of the rail, each splice bar having three projecting bosses; the splice bars are placed with the bosses in contact with web of the rail, and the bosses on one splice bar directly opposite to those on the other. Electrical current is furnished by a powerful transformer and passed through from one splice bar to the other. As electrical contact is made only through the bosses, the bosses and adjacent portions of the rail web are heated to a welding temperature, and then the splice bars are forced together with a great pressure and the weld completed.

The Kleinschmidt invention is along the general line of the fundamental Thomson electric welding process in that the heat is generated in the metal being worked upon and at the points of contact where welding is to take place. It is substantially a case of butt welding and differs from the original Thomson patent chiefly in the fact that three butt welds are made simultaneously, instead of a single butt weld as in the original Thomson patent.

Patent to Burton No. 647,694, dated April 17, 1900, is for a method of heating metals electrically in a convenient position to be quickly transferred to the blacksmith's anvil. Burton provides for

attaching one terminal of his electrical circuit to a copper block fastened to, but insulated from, the anvil. He then provides for the other terminal of an electrical circuit a number of differently shaped electrodes fastened to spokes of a wheel mounted on a swinging arm. In this manner he connects the particular form of electrode adapted to the work being done. He lays the metal to be heated upon the stationary electrode and then brings the movable electrode to a position upon the top of the work, and turning on the current heats the work at the desired place by the passage of electrical current through it. When the metal has reached the proper temperature the current is shut off, the piece removed to the anvil for welding or forging as may be required.

The Burton device is essentially a heating device or electric forge. It makes use of the principles of generating heat within the material to be worked upon by means of electrical current; and in this sense it belongs in the line of development from the original Thomson patent welding.

Perry patent No. 670,808, dated March 26, 1901, is for a method of welding wires or rods crossing each other at an angle. The wires contact with each other over a very small area, theoretically not much more than a point at the start. Electrodes are provided, one in contact with either wire, and an electrical current passed from one to the other. This patent also is in the line of development of the originial Thomson electric welding patent. The heat is generated at the point of contact where the weld is to take place and within the parts to be welded. The particular problem solved by Perry was to effect a weld under these conditions without burning off the wires or injuring them, and his device is apparently well adapted for this purpose. It illustrates the fact that the fundamental Thomson electric welding patent did not cover the field in such a way as to shut out future inventions in the application of the broad principles of electric resistance welding to special problems. Thomson's original patent did not show how such work as is done by the Perry device could be successfully and commercially accomplished.

British patent to deFerranti No. 11,921, accepted August 25, 1904, relates to the electric welding of turbine blades to the disk upon which they are mounted. The blade of a steam turbine is of

relatively small dimensions compared to the disk to which it is attached. When it is attempted to weld the blade to the disk without special preparations, the disk conveys the heat away from the joint more rapidly than does the metal of the turbine blade, so that the turbine blade is raised to a welding temperature before the adjacent portion of the disk. This difficulty will be experienced in the practical carrying out of the welding of the Robinson rail joint, and it is doubtful whether for this reason the Robinson rail joint patent has any practical commercial value.

To overcome this difficulty, deFerranti reduces the sectional area of the metal through which the current flows in the portion of the disk contacting with the turbine blade so as to make it substantially equal to the sectional area through which the current flows in the blade itself. He does this by cutting grooves in several different manners on the external surface of the turbine disk. He thus leaves a certain number of projections upon the surface of the disk opposite each turbine blade, sufficient, as he says, to provide mechanical strength when welded to the blade. The deFerranti invention then is substantially a method of butt welding a number of projecting parts simultaneously to another piece. It is another instance of development along the line of the fundamental Thomson electric welding patent and shows the field open for invention in the application of electric welding to particular problems.

We come now to a consideration of the Harmatta patent in suit, No. 1,046,066, dated December 3, 1912. Harmatta undertakes to solve a problem different from those dealt with by prior inventors, but falling also under the general line of development from the original Thomson electric welding patent. In most of the prior patents which I have considered, inventors were trying to accomplish by electric welding something which had previously been done by a blacksmith using ordinary heating methods. The original Thomson patent proposed to make butt welds of rods and bars, a thing which a blacksmith commonly did. The Thomson roller welding patent also attempted to do by electrical methods what was formerly done in metal working, namely, to make lap weld seams. Kleinschmidt performed a butt welding operation which might have been done in a well equipped forge shop, but which was novel

because of necessity the work was required to be done away from a forge shop and required portable apparatus.

Harmatta, however, attacks a problem which had never been solved by blacksmithing methods. His problem was to fasten together by electric welding flat sheets of metal placed one on top of the other. In the sheet metal art, this had been done previously by the use of rivets. Harmatta replaced rivets by electrically welding the plates at the spots where riveting would ordinarily be used. The method employed by Harmatta was to place electrodes opposite each other with the plates to be joined lying between the electrodes; one of the electrodes was stationary, the other electrode could be moved toward the stationary electrode and forced toward it with considerable pressure. A suitable electric current was passed through from one electrode to the other and a pressure exerted upon the movable electrode. It was found that the current thus passed through the two plates pressed together would raise the metal to a welding temperature and the pressure would produce a weld.

In the development of the art of electric welding prior to Harmatta the area of the surfaces in contact between the two pieces to be welded was always limited in extent. In the original Thomson patent the area of the ends of the rods being joined was the contact surface, and determined largely the amount of heat developed. In the Thomson and Lemp roller patents the amount of overlap of the plates restricted the area of contact surface. In the Robinson, Kleinschmidt and deFerranti patents the size of the projections determined the contact surface, and in all these cases the completed weld was of substantially the same area as the contacting surface.

There was, therefore, nothing in the prior art to show Harmatta that when two sheets were placed one upon the other, contacting over a large area, these sheets could be welded together in an isolated spot. I do not believe that anyone skilled in the art at the time of Harmatta's invention could have stated with any degree of assurance in advance of actual trial that Harmatta's device would produce a real serviceable weld.

It is true that Lemp has shown in his annealing patent, No. 531,197, that by placing electrodes on opposite sides of a piece of armor plate a sufficient temperature could be reached in the line

between the two electrodes to anneal the plate locally. In this case the path of the electrical current was entirely through a homogeneous piece of metal. The shortest path for the current was, of course, directly from one electrode to the other, but since the entire plate was a conductor of electricity, more or less of the current would spread out and flow through other paths. The action is also complicated by the fact that as the metal in the direct path is heated and rises in temperature its resistance increases, which would tend to divert a greater proportion of the current through surrounding portions of the plate.

At the same time, since the iron or steel is a fairly good conductor for heat, the heat generated would flow away toward cooler parts of the plate. Evidently in the case of the Lemp annealing operation the actions taking place are quite complex, and I doubt very much whether Mr. Lemp himself, skilled inventor though he was, felt any great degree of certainty that the operation would be successful in advance of actual trial.

In the Harmatta process of spot welding the reactions are much more complex than in the Lemp annealing operation. The current instead of passing from one electrode to the other through a homogeneous plate passes first into one plate, then across a contact area into another plate and then out at the second electrode. There are thus two plates through which the current is at liberty to spread, and a contact resistance between the plates. The temperature to which the metal must be raised is a welding temperature instead of merely an annealing temperature. For a proper welding operation the temperature of the metal at the weld should be higher than in the metal adjacent thereto so that the relatively cooler metal may exert sufficient pressure to force the welded parts together. Thus, in the Harmatta operation the contacting surface between the two plates directly in line between the electrodes should be the hottest portion of the metal, and the metal adjacent to the electrodes should be somewhat cooler in order to transmit the pressure from the electrodes to the metal at the points welded. If, for instance, the metal adjacent to the electrodes were hotter and softer than the metal where the plates make contact, it might easily be that, instead of making a weld, the electrodes would punch a hole in the plates.

For the reasons given above, it is my opinion that the flow of

electricity and of heat in the practice of the Harmatta process of spot welding is so complex that the teachings of the prior art would not suggest the Harmatta invention, and that with the knowledge and skill available at the date of the Harmatta invention it would not be possible to state whether or not the Harmatta process would be successful in producing commercially valuable welds. As a matter of fact, the Harmatta process of spot welding has proven of immense commercial value, and the fact that the operation seems so simple after it has once been accomplished should add to rather than detract from the merit of the invention. It is the more remarkable in that the fundamental Thomson electric welding patent antedates the Harmatta invention by some seventeen years; and that, while the art was developed in a number of other directions, the development of spot welding waited so long. The reason for this seems to me to be that in the other lines of development of electric welding the attempt was made to accomplish by electric welding what had previously been done by other metallurgical or blacksmithing operations. Harmatta struck out in a new field and accomplished something which had never before been accomplished by any method, namely, the welding together at isolated spots, and without previous preparation, parallel, superimposed metal sheets.

One P. M., pursuant to adjournment, at the office of the clerk of the United States Court.

By Mr. STACKPOLE.

Q. 5. Please look at "Defendant's Exhibit No. 2", the 1901 catalogue of the Warren Electric & Specialty Company, and state what rivet heads you find shown in the pictures of the different desk fans illustrated in the catalogue.

A. In fan marked "A-1" rivet heads are shown on the front sides of all of the fan blades.

Q. 6. And in what relation?

A. Spaced at the corners of a triangle approximately. In A-2 rivets are shown on the front faces of all of the blades, three rivets to a blade, spaced in triangular relation. Fan A-3 rivets are shown on the faces of all of the blades, three to a blade, triangularly placed. Figure A-4 rivets are shown on the faces of the blades, three rivets triangularly spaced. On the upwardly extending blade a rivet head

appears also on the back side. Figure A-5 the rivets are very indistinctly shown; appear to be two rivets to a blade. Figure A-6 the rivets are shown on the front sides of the two blades at the right, two rivets to a blade. On the other fan blades rivets appear to be obscured by the fan guard, a portion of one rivet showing on the left-hand lower blade. Fan E-1, two rivets are shown on the blade extending to the right; one rivet appears on the blade extending downward toward the centre; the other rivets do not appear,—that is, rivets on the other blades do not show. In E-2 there are three rivets to a blade in triangular relation. These show on the blade extending upward and the one extending to the left, but do not show on the blades extending to the right — yes, one shows on the blade extending to the right, but they do not show on the blade extending toward the bottom. Fan E-3 I can distinguish one rivet on the fan blade extending upward. On the other fan blade I cannot find any rivets showing. Fan E-4, two rivets show on the fan blade extending to the left, two on the fan blade extending upward, two on the fan blade extending to the right, and two on the fan blade extending downward, one of these showing on the back side of the blade. Fan G-1, the rivets are three to a blade, arranged triangularly; two of these rivets show on the blade extending to the left, and none on the blade extending upward, two very faintly on the blade extending to the right, and one faintly on the blade extending downwardly On G-2 fan rivet heads do not show on the faces of the fan blades, but one rivet head shows on the back side of the spider arm of the blade extending downward.

Q. 7. Do you find any fan blades described in this catalogue which are made of steel and which are copper-plated or nickel-plated?

A. I do not. The fan blades of all of the types of fans illustrated, except type G, are stated to be finished in polished brass, and other finishes if specified. In the general description of these fans the statement is made that the blades are of best quality of heavy spring brass. In the G-1 and G-2 type fans the statement is that the finish throughout is plain black enamel. No statement is made that different finishes will be furnished with this type fan.

Mr. Pattison. The foregoing question and answer are objected

to as being secondary evidence, the catalogue itself being the best evidence of what it describes or shows.

Q. 8. Please examine the Exhibit H attached to Lipps' affidavit, "Plaintiff's Exhibit No. 30", and state whether this exhibit is spot welded.

A. I should say not. There appear to be four places where current has been passed through, and at one of these places, which from the appearance of the surface was as highly heated as any of them, the plates have parted at the point where the current passed through. There was no weld at this place. By looking through the place at the other edge, which has not fully parted, it is apparent that there is no weld at this point either, as light can be seen through between the plates at the place where the weld should have been. The other two spots do not have the appearance of having been heated to a sufficient temperature to produce a weld. It is a characteristic of a real spot weld that when pulled apart it will tear out some of the metal from one or the other of the plates. I should not consider the welding as shown by this Lipps Exhibit H as of any commercial value whatever.

Q. 9. Look at the Exhibit O attached to McBerty's affidavit, "Plaintiff's Exhibit No. 28". Of what material and finish is the blade of this exhibit?

A. The blade is of iron or steel which has been copper-plated and afterwards blued.

Q. 10. How is that bluing done?

A. The bluing would be done by using some chemical solution to produce an oxide of copper. Various colors can be produced by different chemical solutions.

Q. 11. On this same Exhibit P please examine the cut portion of the spider arm, and state if that shows signs of oxidization.

A. It shows a blue oxide of iron which is produced when iron oxidizes at a relatively high temperature.

Q. 12. What would that indicate with reference to the time when the arm was cut in relation to the time when the welding was done?

A. It would indicate that the iron had been heated up to a temperature sufficient to give blue iron oxide after the piece was cut.

Q. 13. Please examine the Exhibit P attached to McBerty's affidavit as to the same questions, and state the result.

A. Exhibit P attached to the McBerty affidavit also shows a blue oxide of iron at the cut portion of the spider, which would indicate that this part had been heated to a sufficiently high temperature to produce blue oxide after cutting.

Q. 14. Referring again to Exhibit O attached to McBerty's affidavit, do you find any indication that the blade had been riveted?

A. Yes; there is an annular mark about the hole in the surface of the blade, such as would be made by the rivet head being forced down into contact. This shows upon both of the rivet holes.

Q. 15. How about the spider arm in this respect?

A. The spider arm shows similar marks, but not quite so plainly.

Q. 16. Look at "Defendant's Exhibit M", and state the character of the blade and whether it has been finished; and, if so, in what way?

A. The blade of "Defendant's Exhibit M" appears to be of iron or steel, copper-plated and then nickeled.

Q. 17. Do you find any indication on this blade of its having been riveted?

A. Yes; there are annular marks about the holes such as would be made by rivet heads.

Q. 18. Did you have this exhibit in your hands during the trial of the case before Judge Killets recently?

A. I did.

Q. 19. Did you scratch it in any way?

A. I did not.

Cross Examination.

By Mr. PATTISON.

×-*Q.* 20. While defendant did not present the exhibits attached to the affidavits of Lipps and McBerty and is not responsible for them, I will ask you a few questions about them. You have stated as to Exhibit H connected to Lipps' affidavit that it is not spot welded. How are the two plates there attached?

A. I should say that they were probably stuck together by iron oxide.

×-*Q.* 21. Caused by what?

A. Caused by heat at the time the attempt was made to do the spot welding.

×-*Q.* 22. What caused the heat?

A. Apparently an electrical current passed through the plates.

×-*Q.* 23. By the use of electrodes on opposite sides?

A. Apparently so.

×-*Q.* 24. With the apparatus disclosed in the Harmatta patent n suit, the character of the weld depends upon the judgment of the operator, doesn't it?

A. The character of the weld would depend upon the adjustment of current relative to the size of the weld; also upon the skill of the operator.

×-*Q.* 25. And with that apparatus a current could be passed through the two lapped plates a sufficiently short length of time to make the same kind of an effect as in this Exhibit H attached to Lipps' affidavit, couldn't it?

A. That is true; if the current were not properly adjusted or the operator not skilled, the plates might be stuck together as shown in the exhibit referred to.

×-*Q.* 26. Referring to the Exhibit O attached to McBerty's affidavit, how can you tell that the fragment of spider was not blued in the same way the blade was blued?

A. If that were true, then the bluing must have been done after the spider was cut apart. It is rather difficult to tell definitely which was the actual cause of the bluing, but if the spider arm had been cut off and neither heated nor processed, the color of the cut would not be that shown.

×-*Q.* 27. Then, from your conclusion I gather, after several minutes' close scrutiny of the exhibit through a magnifying glass, that it is possible that the spider and blade were blued in the same way?

A. Yes, if the bluing were done after the spider were cut off.

Adjournment to the office of Stevenson, Carpenter, Butzel & Backus.

Pursuant to adjournment to the office of Stevenson, Carpenter, Butzel & Backus.

×-*Q.* 28. Referring to the Harmatta patent in suit, in your opinion, what is the maximum limit of the cross-examination diameter of electrodes that can be used to practice the Harmatta method and produce the article of the patent?

A. I think the diameter of the electrode used would depend somewhat upon the thickness of the sheets which were being spot welded. I have not had sufficient practical experience with spot welding to be able to state the possible limits.

×-*Q.* 29. Then you have no opinion on this question?

A. Only to the extent I think the size of electrodes would vary with the thickness of the plates to be welded, and that the relationship would be somewhat like that shown in the Harmatta patent. It would probably vary within certain limits.

×-*Q.* 30. Do you think electrodes with points of half inch diameter could be used with the proper thickness of plates?

A. I think with plates a couple of inches thick, and with sufficiently heavy current, electrodes half inch in diameter could probably be used. I understand that spot welding has actually been done on plates as much as two inches thick.

×-*Q.* 31. Is it your understanding of the Harmatta patent that the method can be practiced with electrodes having flat ends?

A. It is my understanding that whatever the shape of the points at the start they very soon become more or less rounded in actual operation.

×-*Q.* 32. I would understand from this that you can practice the Harmatta method with electrodes having flat ends?

A. I am not sure that I understand the exact intent of the question. Does the question mean that the flat end shall be of the same diameter as the main part of the electrode rod, or that the end may be flat and then the rod tapered above the flat end? My answer would differ according to my understanding.

×-*Q.* 33. You may consider the question from either of the angles mentioned by you.

A. If the electrode were tapered down toward the point so that the cross-section of metal from the contacting point continuously increased, I do not think it would make any difference whether the actual contact were flat or not. If the electrode were simply a round rod cut off square and flat at the end, I do not think it would be adapted,— certainly not well adapted,— to perform the Harmatta operation.

×-*Q.* 34. But you could weld lapped plates with a straight electrode having flat ends, couldn't you?

A. I think it could probably be done.

×-*Q.* 35. What is your understanding of the object of providing the ends of the electrodes in Fig 3 of the Harmatta patent with longitudinally extending recesses in their ends?

A. I understand the object is to reduce the area of contact between the electrode and the plate. I doubt, however, if electrodes of that form could be used very long without becoming convex instead of concave as shown.

×-*Q.* 36. Take two overlapped plates with the Harmatta weld of, say, two-eighths of an inch in diameter, and drill a hole through the centre of this weld of, say, half the diameter or the weld; is the Harmatta spot weld still present?

A. Something more than half of it would be.

×-*Q.* 37. Would that part of the spot remaining be the spot weld of the Harmatta patent, in your opinion?

A. I should consider that if the weld were made by the Harmatta process the drilling away of portion of the welded piece would not change that fact.

×-*Q.* 38. Now, take two overlapped plates with registering openings, say one-eighth of an inch in diameter, and take the same Harmatta apparatus and make the quarter-inch diameter weld with the opening in the centre of it; would you have the Harmatta spot weld?

A. I think so.

×-39. Now, take two lapped plates with one-eighth inch diameter registering openings and fill the opening with metal, and take the same Harmatta apparatus and make a quarter-inch diameter weld with the opening and the filling in the middle of it; would you have as a result a Harmatta spot weld?

A. That would depend upon the manner in which the hole was filled with metal, and whether in producing the weld the Harmatta operation actually occurred.

×-*Q.* 40. Take the illustration of the preceding question, and fill the opening with metal, the ends of which were level with the outer faces of the sheets; would the result be a Harmatta spot weld?

A. It might be.

×-*Q.* 41. Take the example recited in the second above ques-

tion, and put in the hole a piece of wire of the length equal to bu not exceeding the combined thicknesses of the two plates, an with the Harmatta apparatus make a quarter of an inch weld wit this wire and opening; in the middle of it would the result be Harmatta spot weld?

Mr. STACKPOLE. These questions are objected to as relating t hypothetical and imaginary structures of which no concrete examp is given, and which are not represented by the prior art, and hen the questions are objected to as outside the scope of direct exam nation.

A. I think the resulting weld might be called a Harmatta weld

×-*Q*. 42. Take this same example, and let the wire extend on thirty-second of an inch beyond the outer surfaces of the two plate and with the Harmatta apparatus make a quarter-inch weld wi the wire in the centre of it; would the result be a Harmatta sp weld?

A. If the wire completely filled the hole so that the electrod contacted only with the ends of the wire and not with the plate then I would not consider the weld would be a Harmatta weld. I that case, the heat would be generated in the wire.

×-*Q*. 43. Now, take the example of the preceding question an make your weld with the form of electrodes shown in Fig. 3 of th Harmatta patent so that the projecting ends of the wire extend into the recesses of the electrodes, and the electrodes engaged th plates; would the result be a Harmatta spot weld?

A. If the electrodes engaged the plates in such a way that th current flows through the plates and the contacting portion betwe from one electrode to the other, to that extent I should say that th weld was a Harmatta weld.

×-*Q*. 44. Referring now to Benardos' patent 363,320, on pag 2 thereof, line 27, I find: "In this figure, the apparatus is show in operation uniting the two plates by a process akin to riveting In Fig. 3 of this patent the electric welds are shown as isolate are they not?

A. In Fig. 3 the metal plates are shown to be joined at isolat spots by fused plugs of metal. I should hardly call these welds.

×-*Q*. 45. But your interpretation of Fig. 3 does not appear

correspond with the description of the patent wherein it is stated on page 2, line 29, that:

"By the action of the voltaic arc the metal is gradually melted, the fusion extends through into both plates, the melted portions of which mingled together, so that when the same cool, the two plates, as to said fused portions, are virtually in one homogeneous piece."

I do not find anything about metal plugs, nor any shown in Fig. 3. How about that?

A. The portion quoted in the question is not stated in the specification to apply particularly to Fig. 3, but is a general statement of a working of the apparatus, and whether or not the holes are simply filled with plugs of metal or whether the two plates are fused together, as described in the quotation given in the question, evidently depends upon the length of time during which the voltaic arc is allowed to act. In Fig. 21, for instance, fused metal is allowed to drop upon the plate in order to produce raised letters thereon. I note also that according to this Benardos operation for joining plates in spots, it is necessary to drill holes and otherwise prepare the metal at the places to be joined, as well as to introduce additional metal, and that the whole operation is one of fusion rather than welding; none of which things are required in the Harmatta process.

Deposition closed.

Signature and certificate waived by consent of counsel.

Mr. STACKPOLE. Plaintiff's counsel hereby gives notice that he will proceed to take the deposition of James H. Gravell at the office of Messrs. Fish, Richardson & Neave, 84 State Street, Boston, Mass., on Tuesday, July 22, 1919, at 10 A. M. Counsel for defendant is invited to attend and cross-examine.

BOSTON, MASS., July 22, 1919, 2 P. M., 84 State Street.

Met pursuant to adjournment and agreement of counsel.

Present: J. L. STACKPOLE, Esq., Counsel for Plaintiff;
ALEXANDER S. STEUART, Esq., Counsel for Defendant.

Fifth Deposition of James H. Gravell.

Direct Examination.

By Mr. STACKPOLE.

Q. 1. Did you go this morning with Mr. Steuart and myself to the works of the Thomson Spot Welder Company at Lynn, Mass., and there perform certain operations of welding?

A. Yes.

Q. 2. Did you perform any operations then illustrating the welding of turbine blades to specimens which had been cross-cut with grooves in accordance with one of the modifications of the British patent to Ferranti No. 11,921 of 1903?

A. Yes.

Q. 3. Please describe these operations, describing first the parts with which you operated.

A. Small blocks of metal corresponding to sections of the carrying disc were grooved by cutting with a saw. These grooves were cut across obliquely from face to face of the block, and then another series of grooves were cut obliquely so as to cross the first set of grooves. This produced a number of square projections. The saw cuts were approximately one-eighth of an inch deep and between a sixty-fourth and a thirty-second of an inch wide. Steel blades were prepared corresponding to the blades used on a turbine wheel. In performing the experiment the block representing the turbine disc was clamped in one terminal of a butt welding machine, and the blade representing the blade of a steel turbine was clamped to the other terminal of a butt welding machine. The end of the steel blade was allowed to project about three-sixteenths of an inch out from the clamp which held it. The end of the turbine blade was brought into contact with the flat surface of the block which had been grooved as described, and the switch of the welding machine closed to pass current from one electrode to the other through the work. The end of the blade and the ends of the projections in

contact with the blade soon attained a welding temperature, and on the application of pressure the blade was forced into the disc and an electric weld resulted, uniting the blade to the block representing the disc.

Q. 4. How many welds and how many specimens did you make by this method in the presence of myself and Mr. Steuart?

A. Three specimens of deFerranti's cross-groove welding were made. Specimen No. 1 has two blades attached to it; that is, two samples of welding were performed on sample No. 1. On sample No. 2 one blade was welded, on sample No. 3 one blade was welded.

Q. 5. Were the conditions in making sample No. 3 exactly the same as in making the other samples?

A. No; the blade was made a little shorter, so that it projected about one-sixteenth of an inch from the clamps instead of three-sixteenths, which was the amount the blades extended in the other samples.

(Plaintiff's counsel offers in evidence the three samples produced in the operation, and the same are marked "Plaintiff's Exhibit No. 42, Gravell's First Sample of Ferranti Welding", "Plaintiff's Exhibit No. 43, Gravell's Second Sample of Ferranti Welding", and "Plaintiff's Exhibit No. 44, Gravell's Third Sample of Ferranti Welding".)

Q. 6. Referring to these samples of Ferranti welding, please state the quality of the welds.

A. The welds and samples Nos. 1 and 2 seem to be very good welds. In the case of sample No. 3 the weld may be good, but if I was to weld a complete turbine so that I would be sure each weld was good, I would allow the blades to project from the clamps, as was done in samples Nos. 1 and 2.

Q. 7. Do any of these samples of Ferranti welding show welds in either of the pieces surrounded by unwelded areas?

A. Certainly not.

Q. 8. Do you regard these samples as fair examples of what would result from the process described in the deFerranti patent and applied to the modification in which "intersecting sets of grooves inclined to one another may be cut on the edge of the ring" (Ferranti patent, Provisional Specification, page 1, lines 22, 23)?

A. Yes; if I had made these experiments at the time this provisional specification issued, I certainly would have done exactly the same thing.

Q. 9. Did you see and examine the electric welding machine, so-called the McBerty electric welding machine, comprising an electric welding device and a transformer which was exhibited in court and operated by Mr. McBerty at the plant of the Ford Motor Company during the hearing before Judge Killits?

A. Yes.

Q. 10. Have you had made an electric welding machine similar to that McBerty machine?

A. Yes.

Q. 11. Did you make welding tests this morning on such a machine?

A. Yes.

Q. 12. How, if at all, did that welding machine differ from the McBerty welding machine?

A. This machine differs in one respect as far as I can possibly tell, and that is the secondary of the McBerty machine had four turns, whereas the secondary of the machine which I operated today had but a single turn. The clamps, core, primary and length of secondary circuit I believe were exactly the same in the two machines.

Q. 13. How about the taps on the primary of the transformer?

Mr. STEUART. Evidence in regard to the alleged machine objected to as secondary evidence and as immaterial and irrelevant.

A. The taps on the reproduced McBerty machine are the same as on the original so-called McBerty welder exhibited at the Ford plant and in court.

Q. 14. When you operated the machine at the plant of the Thomson Company this morning, what was the voltage of the current through the primary, how many turns were there in the primary through which this current passed and what was the resulting voltage across the terminals of the welding devices?

A. According to the meters which were placed on the machine, the voltage applied to the primary of the welding machine was approximately 250 volts. The open-circuited secondary voltage

according to a low reading volmeter supplied by the Thomson Company was 1.07 volts. The number of turns in the primary circuit was 222 or 223 and the number of turns in the secondary circuit was one. There were a number of taps on the primary circuit ranging from 500 turns down to the 222 turns. The machine was connected in the strongest position for current in the secondary circuit.

Q. 15. How do you calculate the voltage in the secondary circuit if you are given the voltage in the primary circuit and the number of turns in the primary and secondary respectively.

A. The way the secondary voltage is calculated is to first find the ratio of the number of turns in the primary and secondary circuits. Then knowing this ratio we know that the voltage of the secondary circuit is inversely proportional to the primary circuit. In this case I would first find the number of turns in the primary and then the number of turns in the secondary and divide the number of turns in the secondary into the number of turns in the primary, then the number I obtain by this division I would divide into the voltage of the primary and thereby obtain the voltage of the secondary.

Q. 16. Assuming that the McBerty machine in its present condition with the exception of the number of turns in the secondary is the same as it was in 1901, and assuming that the record in McCurdy's Transformer Book, that there was one turn in the secondary of the transformer, is correct, please state whether or not the machine which you operated upon at the Thomson Company's works this morning is a correct representation of the McBerty machine as equipped with the said transformer having one turn in the secondary.

A. With the exception of having one turn in the secondary, the machine I operated on this morning is identical with the McBerty machine.

Q. 17. Did you operate this machine to make any butt welds in iron rings in the presence of Mr. Steuart and myself; and, if so, what material did you use, what did you do and what were the results?

A. I welded three rings; all the rings were of steel, two of the rings were of round iron stock three-sixteenths of an inch in diameter

which had been formed into rings five inches in diameter. The larger ring was of one-quarter stock and approximately fourteen inches in diameter. The ends of the rings were clamped into the opposing electrodes; the electrodes were then pushed together until the ends of the rings made contact. The current was then applied and when a welding temperature was attained the ends of the rings were forcibly pushed together, forming an electric weld. These welds were typical butt welds in which one end of the work approached the other end of the work in the welding operation; that is, the two parts of the work were forced together while the material was heated, which action resulted in a burr at the time of welding.

Q. 18. What have you to say as to the quality of these welds?

A. These are good butt welds, as strong as any butt welding I have ever seen. One of the welds in one of the small rings is not exactly in alignment, but on test it would prove to be a fairly good weld. As there is no positive means of alignment in the welding machine it requires a little skill to keep the parts in alignment by eye and I did not make as good a job on one of the small rings as I did on the other small ring and the large ring.

(Plaintiff's counsel offers in evidence the three rings produced in the operation, and the same are marked "Plaintiff's Exhibit No. 45, Ring No. 1, Butt Welded on Machine Like McBerty's, but Having One Turn in the Secondary of the Transformer", "Plaintiff's Exhibit No. 46, Ring No. 2, Butt Welded on Machine Like McBerty's, but Having One Turn in the Secondary of the Transformer", "Plaintiff's Exhibit No. 47, Ring No. 3, Butt Welded on Machine Like McBerty's, but Having One Turn in the Secondary of the Transformer".)

Q. 19. Did you then try to do any spot welding with the machine in the same condition and using the same current as in the case of the butt welding of these rings?

A. Yes.

Q. 20. What did you do and with what results?

A. I welded a number of samples of sheet steel, that is, I tried to weld them. Before welding, however, I placed in the machine two pointed copper rods, allowing them to extend from the terminal clamps about five-sixteenths of an inch respectively. I then

placed overlapping sheets between these two pointed electrodes and after pinching the sheets together by means of the electrodes I turned on the current by depressing the foot switch, allowing the current to flow from one electrode to the other through the work. In one case I overlapped steel sheets of approximately twenty-four thousandths of an inch thick, making two welds or endeavoring to make two welds in the sample; removing the work from the machine the sheets were very easily parted by hand, showing that they were simply stuck together and not welded. I repeated the same experiment on other sheets of the same thickness, in this case making three welds. In this case I did not break the sample apart, but in endeavoring to punch a hole through the sample for labelling purposes the sheets became separated, showing that these were "sticks" instead of welds. I also tried to weld another sample using metal in which one sheet was approximately thirty-one thousandths of an inch thick and the other sheet seventy-one thousandths of an inch thick. In removing the work from the machine the parts fell apart and the effort to weld did not even stick them together.

Q. 21. Please state from your knowledge of electric welding whether, with such a machine delivering the amount of secondary current delivered by this machine, it would be possible to obtain spot welds in thin sheets of metal.

A. Commercially considered I should say no it was not possible to obtain spot welds, but from a theoretical or laboratory standpoint I should say that in thin metal you could produce a very small spot weld occasionally. I have tried my best to secure good spot welds on this machine and have failed, although I believe by making the electrodes very pointed or by throwing them out of alignment that on thin sheet metal an occasional spot weld might be produced.

Q. 22. With the machine in the condition it was this morning and using the same current, would it be possible to produce spot welds such as are present in the "Defendant's Exhibit M" and in the sample Exhibits O and P attached to McBerty's affidavit?

A. It would be absolutely impossible to secure welds of this extent on material of such dimensions as these exhibits with the machine I operated this morning.

Q. 23. With the machine in the condition in which you operated

A. Comparing Figure No. 26, "Peerless adjustable swivel desk fan", on page 197 of the "Electrical Review" of February 9, 1901, and the photograph labeled "G-1", I find them to be identical. I note the maker of the plate is "Manz" in both cases, that both fans are in exactly the same position and that the rivets in the two cuts show up exactly in the same places, that the guard is in such a position that its crossing members come directly in the centre of the ring located on the top of the fan. In fact in every case where I compare the two cuts I see absolutely no difference.

Q. 30. Do you find on pages 196 and 197 other reproductions of Peerless fans?

A. Yes, I find Figure No. 22 is a Peerless standard ceiling fan, in Figure 23, Peerless midget ceiling fan. These two figures are on page 196, and on page 197 I find Figure 24, Peerless trunnion and swivel desk fan; Figure 25, Peerless rigid iron clad desk fan and also the fan which I have just mentioned, Figure No. 26, Peerless adjustable swivel desk fan.

Q. 31. In the cases of all these reproductions of Peerless fans do you find the name "Manz Chicago"?

A. Yes.

(Plaintiff's counsel offers in evidence the number of the "Electrical Review" referred to as "Plaintiff's Exhibit No. 54, Electrical Review of February 9, 1901, pages 196 and 197".)

Q. 32. I show you the February, 1901, number of the "American Electrician". Do you find on page 69 thereof an account of the Ninth Annual Convention of the Northwestern Electrical Association, held January 16, 17 and 18 at Milwaukee, Wisconsin?

A. Yes.

Q. 33. And on page 39 of the same number of the "American Electrician" do you find on page 39 the following: —

"The Warren Electric & Specialty Company of Warren, Ohio, exhibited through the Illinois Electric Company a line of its Peerless fan motors, transformers and lamps. Messrs. L. K. Cushing and C. W. Bacon had charge of this exhibit."

A. Yes.

(Plaintiff's counsel offers in evidence the number of the "American Electrician" referred to, the same being marked "Plaintiff's

Exhibit No. 55, February, 1901, Number of the American Electrician, pages 69 and 39".)

Q. 33*a*. I show you the February 16, 1901, number of the "Electrical Review", the page on the inside of the front cover showing an advertisement of Peerless fans by the Warren Electric & Specialty Company. What are the designations of the four fans illustrated?

A. A-1, E-1, K-1 and H-1.

(Plaintiff's counsel offers in evidence the number of the "Electrical Review" referred to; the same is marked "Plaintiff's Exhibit No. 56, February 16, 1901, Number of Electrical Review, inside front cover".)

Q. 34. I show you the following numbers of the following magazines, and call your attention to the pages mentioned that show either advertisements or reproductions of Peerless fans: —

"American Electrician", March, 1902, pages 46 and 47, advertising section page 126.

"American Electrician", March, 1903, pages 44 and 45 of the advertising section and page 136 reading section.

"American Electrician", March, 1904, advertising section page 43 and reading section page 135.

"American Electrician", March, 1905, advertising section page 50 and reading section page 140.

"Electrical World", March 24, 1906, advertising section page 46, reading section page 625.

"Electrical World", March 16, 1907, advertising section page 40, reading section page 561.

"Electrical World", March 7, 1908, page 529.

"Electrical World", March 4, 1909, advertising section page 57, reading section page 589.

"Electrical World", March 3, 1910, advertising section page 63.

Please examine these periodicals and the cuts of the Peerless desk fans therein illustrated, and state which of these, if any, show desk fans in which the fan blades are shown as fastened by two rivets to a spider having the shape of the spider, a fragment of which forms part of "Defendant's Exhibit M".

A. On fans shown on advertising section page 46 "American

Electrician", March, 1902, three rivets are distinctly shown in the upper cut. The lower cut is not distinct enough to see the rivets with the exception of those near the centre of the blade. Page 126 of this same issue, Figure 60 shows a Peerless desk fan motor with three rivets. The Peerless fan motors shown on page 44 of the advertising section of the "American Electrician" of March, 1903, shows Peerless desk fans in two of the cuts and in both of these cuts three rivets are shown. On page 136 of the same issue Peerless fans are shown in Figures 75, 76 and 77. In the three cases the fans are shown with three rivets each. "American Electrician", advertising section page 43, March, 1904, Peerless desk fans as shown on this page each blade is provided with three rivets. On page 135 of the same issue Peerless fans are shown, but in all cases three rivets are used for attaching the blades to the spiders. "American Electrician" of March, 1905, page 50 of the advertising section, Peerless fans are shown in which three rivets are used for attaching the blades to the spiders. On page 140 of the same issue Peerless fans are shown, but in all cases three rivets are used for attaching the blades to the spiders. "Electrical World", March 24, 1906, page 47 of the advertising section, the Peerless fan is shown with three rivets attaching the blades to the spiders and on page 625 of the same issue a Peerless fan is shown in which three rivets are used for attaching the blades to the spiders. "Electrical World", March 16, 1907, page 40 of the advertising section shows Peerless fans where three rivets are used for attaching the blades to the spiders and on page 561 of the same issue a Peerless fan is shown with three rivets used for attaching the blades to the spiders. In the "Electrical World", March 7, 1908, on page 529 of the reading section a Peerless fan is shown where three rivets are used to attach the blades to the spiders. In "Electrical World", March 4, 1909, page 57 of the advertising section three Peerless fans are shown, but in all cases three rivets are used for attaching the blades to the spiders. On page 589 of the same issue a Peerless fan is shown where only two rivets seemed to be used for attaching the blade to the spider. For the first time in the examination of the pictures in these magazines the spider itself seems to be of the same general shape as that on the back of the exhibit referred to in your question. "Electrical World" of March 3, 1910, page 63 of the adver-

tising section shows Peerless fans where two rivets are used for attaching the blades to the spiders. The spiders themselves seem to be of the same general shape as the spiders you referred to in your question, that is, spider used on the back of "Defendant's Exhibit M".

(Plaintiff's counsel offers in evidence the periodicals above referred to, and the same are marked: "Plaintiff's Exhibit No. 57, American Electrician, March, 1902"; "No. 58, American Electrician, March, 1903"; "No. 59, American Electrician, March, 1904; "No. 60, American Electrician, March, 1905"; "No. 61, Electrical World, March 24, 1906"; "No. 62, Electrical World, March 16, 1907"; "No. 63, Electrical World, March 7, 1908"; "No. 64, Electrical World, March 4, 1909"; "No. 65, Electrical World, March 3, 1910".)

Cross Examination.

By Mr. STEUART.

×-*Q.* 35. Referring to the turbine blade Exhibit No. 42, from what did you determine the size, the breadth and depth of the cuts formed in the ring?

A. I read the deFerranti provisional specification and that suggestion combined with my knowledge of the art of electric welding caused me to decide on the dimensions of these cuts. I knew that Ferranti wanted to produce a weld which must be strong enough to withstand the centrifugal force exerted by a rotating steam turbine and I made the welds as strong as possible with that end in view. I was careful not to remove sufficient metal to interfere with Ferranti's object. Ferranti tells us "the object to be kept in mind in this as in other modifications is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficient areas untouched to insure due mechanical strength in the welded joint".

×-*Q.* 36. I understand that in Exhibit No. 44 the turbine blade was reduced in length about one-eighth of an inch, so that before the welding operation it was one-eighth of an inch shorter than the unwelded blades in Exhibits Nos. 42 and 43; is that correct?

A. Roughly speaking, yes.

×-*Q.* 37. I now notice that in the welded Exhibits 42, 43 and 44

the blade of Exhibit 44 is longer than the blades in Exhibits 42 and 43. What has become of the greater length of blades which initially existed in the blades of Exhibits 42 and 43?

A. Your question as to what has become of the extra length on the samples 42 and 43 is easily answered by an inspection of the samples. A burr has been formed which consists of the upset of the blades.

×-*Q.* 38. As I understand the matter, in a resistance welding circuit the initial heating and the maximum heating effect occurs primarily at the point of greatest resistance in the circuit; is that correct?

A. Yes.

×-*Q.* 39. What determines the current-carrying capacity in an electric resistance welding circuit, the cross-sectional area of the conductor or the superficial surface area?

A. Both play an important part in the current-carrying capacity of the conductor. The cross-sectional area has to do with the resistance of the material and the surface measurements have to do with the radiating of the heat of the conductor. If a small area has a large radiating area it may conduct the same current for the heating effect as a large cross-section with a small area.

×-*Q.* 40. I do not know that I understand the answer. I would ask you that if I reduce the cross-sectional area and increase the superficial surface area at any given point in the circuit I can still carry through that circuit the same quantity of current without changing its resistance?

A. Theoretically, the current flowing through a body and its resistance, providing we consider only these two factors, have nothing whatever to do with each other except insofar that if the temperature of the body is altered by an increase in current there is a slight change in resistance. Does this answer your question?

×-*Q.* 41. No; I understand your former answer to be that the superficial surface area and the cross-sectional area were both factors in determining the current-carrying capacity in the circuit. I now wish to know if I can reduce the cross-sectional area and at the same time increase the superficial surface area and still maintain the same current-carrying capacity?

A. My answer is yes. It probably may be that you and I do

not both mean the same by the term "current-carrying capacity". According to my definition of current-carrying capacity I mean the ability of a conductor to carry a current without overheating, the overheating being determined by the purpose for which the conductor is to be used.

×-*Q.* 42. The resistance in the circuit is increased, however, is it not?

A. If you alter the sectional area through which the current flows, you at the same time alter its resistance.

×-*Q.* 43. When you increase its resistance by reducing the sectional area you thereby increase the heating effect at that point, do you not?

A. Generally stated, yes.

×-*Q.* 44. Is there any qualification of that; if so, what?

A. I cannot think of any qualification at the present time.

×-*Q.* 45. If I reduce the cross-sectional area of a conductor, say a round conductor, while still maintaining its round form, do I reduce or increase its heat radiating capacity?

A. You take a round conductor such as a wire and reduce it in diameter, you necessarily reduce its surface area, you therefore reduce its radiating properties, provided, however, you maintain the original current.

×-*Q.* 46. Then it is a fact, is it not, that when I make a pointed welding electrode, thereby reducing the diameter of the electrode while maintaining its cylindrical form — while maintaining its circular form in cross-sectional — I thereby increase the resistance to the flow of current and also reduce the radiating capacity; is that correct?

A. From a theoretical standpoint you may be correct in a very microscopic sort of a way, but the added resistance is so very slight that from a commercial standpoint it can be absolutely neglected. Also the amount of radiation which you have altered by tapering the end of an electrode is so very slight that its effect on the circuit and on the current flowing is practically nothing; that is, if you would have an ammeter in the circuit with a straight flat conductor and then cut a portion of this conductor to imitate the shape of a welding electrode, it would take very delicate instruments to detect any change in the amount of current flowing; in fact, even

with delicate instruments the alteration in current would hardly be indicated.

×-*Q.* 47. Why is that?

A. Because a welding circuit is of considerable length all told and you are only operating on a very small length of this, so that the alteration in this small amount of resistance would hardly be noticeable.

×-*Q.* 48. I hardly think I understand your answer, but I assume that you mean if we have a straight cylindrical conductor, say of the size of the usual cylindrical welding electrodes, and we reduce the diameter at some particular point, to say the diameter of the contacting faces of the usual electrodes, we will not thereby increase the resistance of the circuit sufficiently to be noticeable; is that correct?

A. That is correct. The idea is that resistance depends on two factors, one of which you have entirely failed to consider. Resistance depends on the area of the circuit and its length. You have reduced your conductor for such a short length that the changing in its resistance would likewise be very small.

×-*Q.* 49. By this, expressed another way I take it, that you mean that the smaller but unbroken portion of the circuit under these circumstances has a sufficiently greater current carrying capacity in any given case to let that current pass without being affected by the increased resistance and without producing any particular heating effect; is that correct?

A. I understand you to say the circuit is unbroken. I do not remember having said anything about the heating effect, but you seem to understand me all right. If I make the further explanation that heat is, or tends to be, produced where you reduce your current section, and in case we are speaking now of copper conductors all told, the heat conducting properties of the copper will dissipate or conduct away from the high resistance point most of the heat that is formed there so that the conductor can carry what might be called a tremendous overload, even though it has a high resistance, because the surrounding copper will conduct the heat away from the spot tending to get hot very rapidly. We see examples of this in the specifications for fuses. A fuse must be of sufficient length so that its central portion will not be thermally

affected by the characteristics of the massive terminals through which the fuse is attached. In this case the fuse is of relatively high resistance, and is designed to get very hot on a slight overload, but if the fuse is too short it will not get hot owing to the fact that the heat is conducted quickly into the terminals which hold the fuse in place, and consequently the fuse does not blow at its rated capacity.

×-*Q.* 50. Then I take it that in electrode welding the tapering of the points of the electrodes has quite a modifying effect, that is to say, if they are very blunt they will conduct the heat away from the welding point very much quicker?

A. That is correct; the amount of heat conducted between the so-called blunt taper and a more delicate taper used for welding is noticeable, but not especially great.

×-*Q.* 51. In spot welding is the cross-sectional area of the circuit increased or decreased by the overlapped plates placed between the electrodes?

A. At one time it was considered that the current would spread out and pass through the broad sections of the overlapping plates, therefore if the plates were overlapped more than the contact area of the electrodes the circuit would entirely fill up the plates, and this would tend to enlarge the circuit at that point. At the present time, however, spot welding seems to have taught us that the current does not spread out through all of the plates but passes directly through the plates from one electrode to the other, continuing in its slender path, the size of which is governed by the contact area of at least one of the electrodes. In case the overlap is larger than the end of the smallest electrode it does not seem to have any influence on the sectional area of the current as it passes through the work. That is, after we have lapped the sheets sufficiently so that the tools do not approach the edges of the sheets we can increase or diminish the overlap without in any way affecting the sectional area of the current as it passes through the work.

Mr. Steuart. Objected to as not responsive to the question.

A. My answer is in accordance with my understanding of the question. I will ask you to put your question in slightly different words if I do not seem to have answered it.

×-*Q.* 52. Is that the best answer you can give?

A. I understand your question to say, is the sectional area of the circuit increased or diminished by the amount of overlap of the work. The whole question seems to depend on our definition of circuit. My definition of circuit is that through which the current flows, and if the current does not flow through the entire sheets surely the circuit is not increased or decreased by the amount of overlap in the sheets, providing the sheets are sufficiently overlapped to take the path provided by the pointed electrodes.

×-*Q.* 53. Then I understand your theory to be that we can disregard insofar as the conductor through which the current flows is concerned all those parts in the overlapped sheet which are outside of an area equal to that defined by the contacting faces of the electrodes with the plates; is that correct?

A. No, that is not correct, and I do not remember having made a remark to indicate that.

×-*Q.* 54. I understand your theory to be that current does not flow except in the restricted area defined by the electrode. If I misinterpret your answer, please explain it.

A. You are correct in that. From a practical standpoint the current stays in this path; there may be current in other parts of this sheet, just as they say there are parts of our atmosphere in the sun.

×-*Q.* 55. Will you now tell me what the cross-sectional area of a rod one-quarter of an inch in diameter is?

A. Less than one-sixteenth of a square inch; about one-twentieth of a square inch.

×-*Q.* 56. The "Plaintiff's Exhibit No. 50", then, has about that cross-sectional area at the ends that are welded together?

A. Yes.

×-*Q.* 57. Now, what is the area of the contacting faces of the electrodes "Plaintiff's Exhibit No. 52"?

A. They are one-eighth of an inch in diameter; about one-eightieth of a square inch.

×-*Q.* 58. In your direct examination you have referred to a difference which I do not quite understand; I would like to have you explain what the difference is between what you term a "stick" and a weld. You referred several times to plates being stuck

together and other plates being welded together; I wish to know what the distinction is?

A. The practical distinction is that the plates are very easily separated in a "stick" without tearing the surfaces or pulling the fibre of the metal apart In the case of a weld the metal does not break along the plane surface as in the "stick" but across a jagged surface, showing that the metal has been intimately connected, or as we term welded.

×-*Q.* 59. Do you mean that the metal is reduced to that state of fluidity in welding where the two metals of the two parts to be united intermingle or flow together as distinguishing between what you term a weld and a "stick"?

A. In a weld the metal has been raised to a sufficient temperature to make it waxy or soft, and in this state we know that the two bodies placed together will cohere; but when the metal has not been raised to a sufficient temperature to produce this welding condition it may "stick" together to some extent, probably due to the fusing of oxides on its surface, and it is simply stuck together, not intermingled as when the temperature is high enough for the welding.

×-*Q.* 60. Have you ever watched a weld being made and seen the metal boil and bubble at the welding point, in some cases actually running away from the welding point?

A. I have seen metal raised to this temperature, but this is much higher than is required in welding. Sometimes we say the metal seems to flow when a blacksmith welds, but if the metal is flowing it is simply on the surface, as surely a blacksmith could not pick up a melted bar. If you refer to blacksmiths' welding, I have no doubt you have mistaken the flowing of the flux which the blacksmith puts on.

×-*Q.* 61. I have said nothing about blacksmiths' welding. I am perfectly familiar with that process and what takes place; I am now asking about electric welding, and you may confine your answers to that. Have you ever examined the process of welding, butt welding if you please, through colored glasses, and you could see the action without your eyes being so affected by the light that you could not see the actual condition of the metal?

A. Yes, I have viewed welding through colored glasses.

×-*Q.* 62. Did you not then observe the metal turned into a fluid condition at the weld?

A. Not in every case; the cases were unusual where I observed it.

×-*Q.* 63. Was such a condition produced, namely, was any of the metal reduced to a fluid condition in the welding of Plaintiff's Exhibits Nos. 42 and 43?

A. I would not say that the metal was reduced to a molten state, because I am the one who welded the sample and I had my hand on the operating lever and applied considerable pressure and would have known immediately had the metal melted, for in that case it could not have withstood the pressure and I would have felt this effect. I would not say that the metal had melted in these samples Nos. 42 and 43.

×-*Q.* 64. And in sample No. 44 still less of this melting effect, I take it, occurred?

A. I did not say anything about that such an effect took place, therefore I cannot admit that less took place than in sample 44.

×-*Q.* 65. How about the Plaintiff's Exhibits Nos. 48, 49 and 50?

A. The burr on these samples show that the metal did not melt; it was, however, very hot, especially in the larger ring. I also had my hand on the operating levers in this case and would have immedialely noticed it had the metal in contact become liquid. This effect would be communicated to me by the feeling of the levers, on which I always maintained at least a little pressure.

×-*Q.* 66. I show you now one plate of a sample which you saw me weld this morning and which corresponds in thickness to Plaintiff's Exhibits Nos. 48 and 49, and would ask you if that shows a weld or a stick?

A. In most cases it shows a stick; there is, however, an indication of a very small weld in the centre of the stick.

×-*Q.* 67. Do you find any evidence of such a weld in any of the Plaintiff's Exhibits Nos. 48, 49 and 50?

A. No, I do not.

×-*Q.* 68. How long did you leave the current on in making these samples?

A. I will have to guess at this; I remember that we were leaving it on a long time for a spot weld; I would estimate seven or eight seconds, probably ten.

×-*Q.* 69. Does it make any difference in the time because of the thickness of the metal?

A. I think we left them all on a long time; we probably left the larger samples on longer than the thinner samples. The point I wish to make is no matter how long we left the current on it is very improbable that we would ever have gotten a spot weld.

×-*Q.* 70. Do you mean actually a spot weld or do you mean what you have termed a commercial spot weld?

A. I do not believe we would ever get a spot weld which would be theoretically called a weld, certainly not a commercial spot weld.

×-*Q.* 71. How long did you ever leave the contacts on in that particular machine?

A. I think the longest I ever left the contact on was three-quarters of a minute on sheets that were approximately one-thirty-second of an inch thick.

×-*Q.* 72. Did you ever leave it on long enough to fuse a hole in a thin sheet?

A. It would be impossible to fuse a hole even on a thin sheet in that machine.

×-*Q.* 73. Would it be possible to fuse the ends of rods one-eighth of an inch in diameter such as the two small rings welded?

A. You had the exhibits this morning to answer that question. You could certainly fuse the ends of rings one-eighth of an inch in diameter; the metal would drop out and melt.

×-*Q.* 74. What is the distinction which you draw between a theoretical spot weld and a commercial spot weld?

A. One could be used in commerce and the other could not; one is a certain factory operation and the other is a laboratory experiment.

×-*Q.* 75. I mean the physical differences.

A. If a spot weld was too small to be of commercial use, I would not say it would be a spot weld.

×-*Q.* 76. How small would it have to be to be too small to be of commercial use?

A. The welds you made on the machine this morning certainly would not be of much commercial use, if any commercial use, from the material you welded, because you easily broke it apart with your fingers.

×-*Q.* 77. I call your attention to the weld that I made and pulled apart before it broke, bent one corner of the metal plate, doubled back on itself and then broke; does this change your view?

A. Not the slightest.

×-*Q.* 78. You have referred to the possibility of using the machine you were working with this morning for the heating of rivets; would it in your opinion make any difference whether or not those rivets were driven tightly in the holes or fitted the holes loosely?

A. It would be to the advantage of the machine for the rivets to fit the holes loosely; in order to get a rivet into the work it must be smaller than the hole and therefore in commercial working the rivet really does not touch the sides of the holes to any great extent; there is an air space there which breaks the continuity of the metal and therefore interferes to greater extent with the conduction of heat. If the rivet was driven tight and in firm contact with the metal of the surrounding hole, it is very doubtful if the machine would heat such a rivet throughout.

×-*Q.* 79. In spot welding with commercial machines I notice that the electrodes are clamped on the work and immediately prior to the cutting off of the current the electrodes always advance very slightly; is this in accordance with your observation?

A. Yes; but the observation has to be very acute in ordinary thin work to notice that the spot welding is done correctly; take for example sheets .0014 of an inch thick, in case the electrodes would advance .0028 of an inch, which is a very small amount, they would be entirely through the sheets. But in welding this kind of work and then calibrating it afterwards we notice that the electrodes move not more .002 or .003 of an inch and if your observation has seen .002 or .003 of an inch at a distance from an electrode you have very fine observatory powers. There is I admit an advance of the tools to a slight extent, but I fail to agree with you that it is always noticeable.

×-*Q.* 80. And this reduces the thickness of the stock at the weld to the same extent that the electrodes advance, does it not?

A. There is a very slight thinning of the work at the weld in some cases.

×-*Q.* 81. In other words, the work is pressed more intimately in contact at the welding point?

A. No, I do not think it is pressed into any more intimate contact from a physical standpoint; that is, the work is in contact all over and the whole section through which the current passed is condensed, due to the welding pressure. There is no doubt but the work is pressed into intimate contact at the weld from a molecular standpoint, but from a pure physical ordinary standpoint it is in contact throughout the overlapping portions; even the pressing of the work with a tool like hitting it with the ball end of a hammer is very similar to what is produced when the welding is done correctly.

X-*Q.* 82. Do you agree to the scientific theory that you cannot put any pressure on one side of a plate of metal without producing a bulge on the other side?

A. No, I do not agree if you hit a slab of steel one inch thick with the ball end of a hammer that you put a corresponding bulge on the other side.

X-*Q.* 82*a*. Suppose you maintain the pressure?

A. No, I do not agree with the scientific theory, because I have in mind pressing the metal in a die without causing any deformation on the other side of the metal, however; for instance in the manufacture of coins.

X-*Q.* 83. Referring to "Plaintiff's Exhibit Electrical World of March 4, 1909", Exhibit No. 64, page 589, what cut did you refer to on that page as showing a spider corresponding to "Defendant's Exhibit M"?

A. The cut labeled "Peerless Universal Fan".

X-*Q.* 84. What part of the spider can you see in this cut?

A. The central portion and the beginning of the arms.

X-*Q.* 85. What is the shape of the arms?

A. The arms as far as they go seem to be of the same shape as the arm of Exhibit M.

X-*Q.* 86. How does the part of the spider shown in the cut on page 589 differ from the part of the spider shown at the lower right-hand corner of page 57 of the advertising section of this same exhibit?

A. The spider in the Peerless Universal Fan, page 589, has but two rivets, whereas the spider of the fans shown on page 57 of the advertising section has three rivets and the spider of the lower

right-hand fan on page 57 has a pronounced hub extending towards the observer, whereas this extension on the other fan on page 589 is not nearly so pronounced.

×-*Q.* 87. My question was addressed to the difference between parts of the spider that are shown in these cuts and not to what you deduce is the form of the spider from the number of rivets; will you please answer the question with that understanding?

A. The hub of the spider on page 57 of the advertising section is very well pronounced, extending towards the observer. The hub of the spider on page 589 does not seem to have this well pronounced hub extending toward the observer.

×-*Q.* 88. And you think that is characteristic of the two-rivet spider?

A. I do not know that the hub part is especially characteristic of the two-rivet spider; you simply asked me to compare these two figures and I have pointed out the difference in the spiders. You have told me not to consider anything that I cannot see, to disregard the two or three rivet holes.

×-*Q.* 89. Then, so far as the cut illustrates the spider itself, that is the sole reason that you think it resembles "Defendant's Exhibit M"?

A. Yes, it has that flat appearance which seems to be present in the Exhibit M.

×-*Q.* 90. Then, as I understand it, your reasons are based on this flat centre and the presence of two rivets instead of three?

A. Yes.

×-*Q.* 91. Will you now please look at the lower right-hand cut in "Plaintiff's Exhibit Electrical World, March 3, 1910", which has a two rivet connection with the spider, and tell me if you find there shown a hub at the centre?

A. Yes; but this hub does not extend toward the operator to any extent. I am familiar to some extent with electric fans and can see in this fan that the spider itself is flat and I know that if this fan was turned 90 degrees the hub would not seem to extend out from the spider to any extent. It is practically flat.

×-*Q.* 92. Have you ever noticed any commercial spot welds that break apart, showing what you have herein termed an example of sticking rather than a welding?

A. I have known spot welds which ought to have been commercial welds to come apart, but the fact that they did come apart showed that they are not commercial or valuable.

×-*Q.* 93. Is the cause of failure to make those welds ever due to failure to leave welding current on for a sufficiently long length of time?

A. This seldom happens because commercial welding is done very quickly, — the current only being left on a very short time, sometimes only a fraction of a second. A spot weld is one which unless the work welds very quickly it is not likely that it will weld at all. Answering your question definitely, it is my opinion that it seldom happens that a weld is defective because the current is not left on long enough.

×-*Q.* 94. Does it ever happen?

A. I do not know. I would imagine that sometimes it might happen.

Redirect Examination.

By Mr. STACKPOLE.

RDQ. 95. Assuming that in the McBerty machine the secondary delivered four volts to the welder and in the machine which you operated this morning the secondary delivered one volt to the welder, what is the ratio of the heating effects of the two currents?

A. If the voltage was increased four times with the same work, electrodes, etc., the amount of current would be increased four times; that is, if we multiply the voltage by four, the current would be increased four-fold; now, as the heating effect depends on the square of the current and there is four times as much current flowing, the heating effect would be sixteen times as great.

RDQ. 96. Mr. Steuart has shown you a sample which he made this morning showing a very minute weld; how does it happen this sample showed such a weld and the samples made by you do not show such a small weld?

A. It is almost impossible to say; he may not have had his electrodes in alignment; this is simply a personal matter with the machine, because as I have testified before there is no means in the machine to secure the alignment of the electrodes, and in case there was a small speck of metal directly between the sheets at this point

to greatly concentrate the current of a speck of rust may have interfered with the passage of the current so as to produce a heating effect which would just turn the tide sufficiently to produce the minute weld.

Recross Examination.

By Mr. STEUART.

R× *Q*. 97. How many welds did Mr. Steuart make?

A. I do not seem to have remembered. I think it was only one, it may have been two.

R× *Q*. 98. Did not he attempt to make one weld and the electrode on the right-hand side of the machine slipped out of place and then you clamped the electrode tightly and he made one more weld about which you have been testifying?

A. I think that is correct.

R× *Q*. 99. Did he not state that it was the first time he ever tried to obtain a weld?

A. Yes.

R× *Q*. 100. Have you any reason to doubt that?

A. I have not.

(Signature and certificate waived.
Adjourned to further notice.)

FINDLAY, OHIO, July 25, 1919, at 3 P. M.

Met pursuant to agreement of Counsel.

Present: J. L. STACKPOLE, of Counsel for Plaintiff;
A. S. PATTISON, Counsel for Defendant.

(Counsel for plaintiff offered in evidence the 1907, 1908 and 1910 catalogues of the Peerless Electric Company of Warren, Ohio, and the same are marked, respectively, "Plaintiff's Exhibit 66, Peerless 1907 Catalogue", "Plaintiff's Exhibit 67, Peerless 1908 Catalogue", and "Plaintiff's Exhibit 68, Peerless 1910 Catalogue".)

Plaintiff's counsel states that he has been unable to obtain possession of the catalogues of the Peerless Electric Company for the years 1905, 1906 and 1909, and calls upon the defendant, if it possesses copies of those catalogues to produce the same.

405 Plaintiff's counsel also requested the defendant to furnish plaintiff photographic copies of all the pages describing desk fans, or illustrating desk fans, in the defendant's exhibits, which are catalogues of either the Warren Electric & Specialty Company or of the Peerless Electric Company, with the exception of the catalogue of 1902, of which plaintiff's counsel has a copy.

Mr. Pattison. Defendant's counsel replies that defendant has no Warren Electrical & Specialty Company or Peerless Electric Company catalogues other than those that have already been offered in evidence.

(Certificate waived by agreement of counsel.)

Boston, Mass., August 6, 1919—10 a. m.

Met pursuant to agreement of counsel.

Present: J. L. Stackpole, Esq., Counsel for Plaintiff; A. S. Pattison, Esq., Counsel for Defendant.

Second Deposition of Thomas Howe.

Direct examination.

By Mr. Stackpole:

Q. 1. Are you the Thomas Howe who has already testified in this case?

A. I am.

Q. 2. Have you read a copy of the deposition of F. P. McBerty recently given at Warren, Ohio?

A. I have.

Q. 3. In that deposition Mr. McBerty has stated that he went with you to the plant of the Peerless Electric Company to assist in a search for any spot welded fan blades that you could locate, and that this search occurred during your investigation of the evidence of his alleged 1901 spot welding. Did you make such a search?

A. No.

Q. 4. What circumstances were there in connection with your investigation of this matter which enables you to testify that you did not make such a search?

A. I recall very distinctly the circumstances of my going to the Peerless Electric Company with Mr. McBerty. He had told
406 me that a number of people whom he knew and who were employed at the Peerless Electric Company might be able to give us some testimony as to his use of electric spot welding. We went to the Peerless Company to see these men. When we arrived at the Peerless Electric Company, Mr. McBerty and I were taken up to the office of the president of the company and he sent out for two or three men that Mr. McBerty thought might recollect something about the spot welding. After we had interviewed these men in the office of the president of the company we left the building, and in passing out we went through various rooms and from time to time spoke to people who seemed to be known to Mr. McBerty. If

I was ever in a store-room or stock-room of the Peerless Electric Company I was unconscious of it. Possibly some of the rooms that we passed through in going in or coming out might have been a store-room or stock-room, but, if so, I did not know it. Certainly I was not looking for any spot welded fans or fans of any kind, because Mr. McBerty, as I have previously testified, had told me that no fans with spot welded blades had been built, and I certainly was not looking for something which I thought was not in existence. My recollection is further fortified in making this statement because of the fact that the affidavits say nothing about the production of fans with spot welded blades. I was in Warren for the purpose of getting the facts in regard to any early spot welding by Mr. McBerty for use by a defendant, and I was keenly alive to the value of any production of fans and particularly their going into commercial use if such fans had spot welded blades. I am therefore positive that if Mr. McBerty had ever told me that he had produced such fans that I would have put it into the affidavit. The fact that it is not in the affidavit absolutely confirms my recollection that I didn't know of any fan with spot welded blades, consequently couldn't have been looking for it anywhere, and consequently was not looking for it at the Peerless Company and had no reason for being in the stock-room.

Q. 5. In the same deposition Mr. McBerty had testified that although he told you that he had made some spot welded blades that went into commercial fans the mention of this fact was left out of the affidavit because you had no tangible evidence of such
407 work and could not locate such a fan or positively identify it. Do you agree with this statement of Mr. McBerty?

A. I do not. As I have testified, I cannot conceive that with my keen appreciation of the value of such a fact I could have said anything of the kind or intimated it.

Q. 6. Were the affidavits collected by you taken for use in court or for what purpose?

A. I was sent out by Mr. Edwards to get the facts as to the alleged use by Mr. McBerty of spot welding so that he might judge of the value of the proposition as a defence in the Barney & Berry suit. The statements were taken in the form of affidavits because it was believed in this way the statements would be given more serious consideration, and further that if given in the form of affidavits the statements would be in more fixed form so that it would be accurately known what could be depended upon in the way of testimony if it should be decided to present the matter in the suit.

Q. 7. In the same deposition Mr. McBerty has testified that the call you and he made on Mr. McDonald was very brief, and the interview as to the electric welder and spot welded blades did not cover a period more than three or five minutes. What have you to say as to this matter?

A. I do not at all agree with what Mr. McBerty says, as you have stated. Mr. McDonald lived at a considerable distance outside of Warren; as I recollect, it was stated to me in Warren, and I think by Mr. McBerty, that the distance was about eight miles. We went out there in an automobile and talked the matter over with Mr. McDon-

ald, and used every effort to stimulate his recollection by suggesting things both by Mr. McBerty and myself which we thought would refresh Mr. McDonald's recollection. This I am sure occupied a much longer time than you stated in your question, and I am very sure that I would not have taken the trip as I have stated without getting everything that I thought could be obtained, and apparently Mr. McBerty was helping me all he could to do it.

Q. 8. What did you do about obtaining a statement from Mr. McDonald?

A. I prepared an affidavit for him, but there was no notary out in the country where he was before whom it could be executed, so I gave it to Mr. McBerty with the understanding that the next time
408 Mr. McDonald came to town he would execute it, then Mr. McBerty was to send it to me in New York.

Q. 9. Did you ever receive the McDonald affidavit from Mr. McBerty?

A. I did not.

Cross-examination.

By Mr. Pattison:

X Q. 10. Did you meet the president of the Peerless Electric Company on the occasion of the visit referred to by you?

A. I believe it was the president; it was one of the officials of the company. It is my recollection now that it was the president; however, it was one of the officials who had a private office and I should say he was the president of company.

X Q. 11. Do you recall his name?

A. I don't recall his name now; I do remember, however, that Mr. McBerty told me that he was formerly a mayor of the town or city of Warren, Ohio.

X Q. 12. Was his office in the front of the building?

A. I believe it was; I know that we went a rather round about way to get to it as it seemed to me, but after we got there, as I recall, we could see out into the street, so I conclude it was on the front of the building.

X Q. 13. Did you enter the building from the front?

A. Yes, I think so; it was the door which appeared to be the main entrance opening out on to the street.

X Q. 14. Was the office to which you went on the first or the second floor of the building?

A. It was not on the first floor; I believe it was on the second floor, but it might have been on the second or third floor; I know we went upstairs.

X Q. 15. Do you recall the employees of the company that were brought into the room for you to talk with about the spot welding?

A. I think one was named Estabrook and his first name was I believe David, with a middle letter R. I believe also there was a man by the name of Bean. That is all as I remember now.

X Q. 16. Don't you recall that on reaching the president's room

you entered the building from the front into a hall, went
409 the stairs to a hallway on the second floor and from this h
way into the president's room, which as you say was loca
on the front of the building?

A. That sounds as if it might be a correct description of our cou

X Q. 17. Then you recall only two employees of the Peerless C
pany with whom you talked on this occasion?

A. I don't now recall the names of any others.

X Q. 18. Do you recall that the president's name of the Peer
Electric Company was Ward?

A. It seems to me that it was, but I wouldn't like to say positiv

X Q. 19. I suppose you were introduced to this officer of the P
less Electric Company, whoever it was that you met there?

A. Yes.

X Q. 20. I understand you are not sure whether it was the p
dent?

A. I believe it was the president; I think Mr. McBerty told
that he was the president.

X Q. 21. Do you recall on which side of the hallway the o
was located?

A. That is another thing which I wouldn't like to say with a
lute positiveness, but it seems to me that in going into his room
turned to the right.

X Q. 22. You were walking towards the street and turned to
right into his office?

A. The directions are getting a little bit too minute for m
remember. As I said before, we went through a number of h
and rooms upstairs and to tell just what direction I turned at
particular point is rather hard to do.

X Q. 23. Did you make more than this one visit to the Peer
Electric Company with Mr. McBerty while you were investiga
this spot welding proposition?

A. I only made one visit to the Peerless Company with Mr.
Berty.

X Q. 24. Did you visit the Peerless Electric Company at any t
without Mr. McBerty?

A. After we had interviewed the men, as I have state
410 went back to Mr. McBerty's office and prepared affidavits
then I believe I went by myself to take those affidavits u
the Peerless Company to have them executed.

X Q. 25. Whose affidavits did you take up to the Peerless C
pany for that purpose?

A. As I say, I recall two of the names, Estabrook and Bean; t
might have been others, but I do not recall any of the names now

X Q. 26. Did they execute the affidavits at the Peerless Elec
Company?

A. That is my recollection.

X Q. 27. Did you take a notary out there with you?

A. I don't remember doing that.

X Q. 28. Then how were the affidavits executed at the Peer
Electric Company?

A. I don't remember whether the notary was somebody in the Peerless works, or whether he came in from outside.

X Q. 29. Did you ever visit the Peerless Electric Company on any other occasion except these two which you have mentioned?

A. I never visited the Peerless Electric Company except at this time of my visit on the McBerty matter in the fall of 1913, and I don't think that I was at the Peerless Company other than the times I have stated.

Deposition closed.

Signature and certificate waived.

Boston, Mass., August 20, 1919—10.30 a. m.

Met pursuant to agreement of counsel.

Present: J. L. Stackpole, Esq., Counsel for Plaintiff; Melville Church, Esq., Counsel for Defendant.

Sixth Deposition of James H. Gravell.

Direct examination.

By Mr. Stackpole:

Q. 1. Are you the James H. Gravell who has already testified in this case?

A. Yes.

Q. 2. Have you at my request made a search for a G type
411 of desk fan made by the Warren Electric & Specialty Company in the year 1901, as described and pictured — the catalogue of that company for that year?

A. Yes.

Q. 3. Please state the circumstances of your search for such a fan.

A. I really commenced looking for a fan (that is, a G fan made by the Warren Electric & Specialty Company in 1901) as soon as I discovered that such a fan was of interest in this suit, and have really been looking for this fan for over a year. When you made a request that I try to secure such a fan, I put considerable attention to the search and went all over New York City, that is, all over the parts where I thought one of these fans could be secured. I directed my attention mostly to Center Street and the adjacent streets where the second-hand stores are located. I called at these stores personally, made inquiry regarding the fan in question, and also went through the stock of fans on hand at each one of these second-hand stores. I was unable, however, to locate any of the fans in New York City. I next directed my search to Philadelphia, and called at many secondhand fan stores in that city I took my automobile and went up and down the various streets where the old second-hand stores and junk stores were located, and examined many fans in these old second-hand and junk stores, but entirely failed to locate any G type fans. I then got in touch with the Electric Salesmen Association, and through Mr. Goeforth interested the

men who sell electrical supplies throughout the State of Pennsylvania, requesting them to secure one of these fans, if possible. Mr. Goeforth finally advised me that, although the ones he had spoken to had made a diligent search all up through the State of Pennsylvania, they were unable to find a fan meeting with my description. I had almost given the search up when it occurred to me that some private parties might still have one of these fans in operation; so I remembered reading in one of the electrical magazines of 1901 that many fans of the Peerless make had been sold to various firms on Chestnut Street between Broad Street and the Delaware River. I therefore decided to call on the old established firms in hopes that I might locate a fan. I started in at Broad and Chestnut Streets, and I believe went into every store in succession, and examined what fans I had access to. I also called at the Continental Hotel, an
412 old established hotel in Philadelphia, and interested their engineer in trying to find a fan for me, but without avail.

After visiting many stores I came to J. B. Shannon Hardware Company's store, 814 Chestnut Street Philadelphia, and walked through their store, but no Peerless fans were in sight. I then went on to the further part of the store and into one of their back offices, and there on a shelf above a bookkeeper's desk I noted a fan which seemed to exactly agree with the disclosures in the 1901 Warren Electric & Specialty Company's catalogue. I asked the bookkeeper to permit me to examine the fan, which permission he granted. I borrowed his stool and thoroughly inspected the fan. A closer examination seemed to indicate that it was the fan I wanted. I then went into the store proper and purchased a small horse-shoe magnet, so that I could test the blades to see if they were of steel. Having satisfied myself that they were of steel, I got in touch with the manager and purchased the fan. This fan I brought to Boston, and it is the fan in my presence at the present time, in exactly the same condition in which I bought it. The fan was in running condition at the time I made the purchase.

Q. 4. Please produce the fan in question.

A. I here produce the fan in question.

(Plaintiff's counsel offers the fan produced by the witness in evidence as "Plaintiff's Exhibit 51, Fan Purchased by Gravell".)

By Mr. Church: Objected to as incompetent, irrelevant and immaterial.

Q. 5. Is the fan Exhibit 51 exactly in the condition in which you first saw it at the store of J. B. Shannon in Philadelphia?

A. It is in exactly the same condition. I might add that the string now attached to the top has been placed there by me in order for me to carry it, and the electric wires running to the fan were disconnected from the fan when I made the purchase.

Q. 6. Please compare this fan, Exhibit 51, with the cut of the G-1 fan shown in the 1901 and 1902 catalogues of the Warren Electric & Specialty Company.

A. The catalogue which I hold in my hand is a 1902 Peerless catalogue, and I remember distinctly that the same cut of this fan

is also shown in the 1901 Warren Electric & Specialty Com-
413 pany's catalogue, the two cuts being, as far as I possibly can tell, made from the same photograph and therefore identical. My remarks pertaining to the 1902 catalogue of the Warren Electric & Specialty Company would likewise pertain to the 1901 catalogue. Comparing Exhibit 51 with the cut G-1, I find them to be identical. The base has the fluting and the fan is of rigid construction, that is, there are no adjustments for turning the fan in various positions. The cut of the G-1 fan indicates blades with three rivets, and I note these three rivets are in the Exhibit 51. Referring to the guard, the cut shows a central ring connected to the outer rings by a number of wires. These wires have the same shape, and in both the cut and Exhibit 51 the number of the wires is the same. The cut shows an eyelet at the top of the fan, which is evidently missing in Exhibit 51, because I note in our Exhibit 51 a hole is provided for screwing in this eyelet. I asked regarding this when I purchased the fan, and they could tell me nothing about it. It therefore has evidently been lost during the life of the fan. I remember in the testimony and in, I believe, the 1901 catalogue the fan in question had but a single speed, and I note that Exhibit 51 has but a single speed. The cuts of the G-1 indicate a solid sort of a spider, which has all the appearances of being cast. Exhibit 51 has a cast brass spider. The cuts indicate four arms for holding the spider to the motor case. In our Exhibit 51 but two of these arms remain, that is, the upper two. The lower two have been lost. The reason I say this is because the provisions at the bottom for screwing on these arms are present in the motor case. Flats have been provided for seating these arms on the motor case, and holes have been provided for attaching these arms with screws. The cuts of G-1 show a center mark in the center of the armature shaft. This center mark is also present in our Exhibit 51. When the fan constituting our Exhibit 51 is set in a similar position to the view shown in the cuts of the fan the exhibit and the cuts exactly agree in every detail. The cut labelled G-1 in the Peerless catalogue of 1902 seems to indicate that there is a name plate on the top of the fan. This name plate is also missing in our Exhibit 51. I also made inquiry from J. B. Shannon regarding this, but they could furnish no information in that direction. This name plate evidently, therefore, has been
414 lost during the life of the fan. As far as I can possibly tell by a minute examination and a comparison of the cuts and the exhibit, they both agree in every detail.

Q. 7. In Exhibit 51 how are the ends of the fan guard rings fastened together?

A. The fan guard rings are fastened together by an electric butt welding operation.

Q 8. Can you see the butt welds on those rings?

A. Yes.

Q. 9. Of what material are the fan blades of Exhibit 51?

A. The fan blades themselves are of steel.

Q 10. What is their finish?

A. The finish is black enamel.

Q. 11. Anything else.
A. The black enamel has been applied directly to the steel.
Q. 12. Of what material are the fan guard rings?
A. The fan guard rings are of steel.
Q. 13. Of what material is the spider of Exhibit 51?
A. The spider is of brass.
Q. 14 Of what material are the rivets?
A. They are of brass.
Q. 15. How many rivets to a spider arm in the blade?
A. Each blade is attached to each spider arm by means of three rivets triangularly located.
Q. 16. Please look now at Plaintiff's Exhibit 66, Peerless 1907 catalogue; Plaintiff's Exhibit 67, Peerless 1908 catalogue; Plaintiff's Exhibit 68, Peerless 1910 catalogue, and the copy of the 1902 catalogue which I happen to have, and state which, if any, of these catalogues show desk fans with spiders of the same general type as that embodied in Plaintiff's Exhibit 51, and which of these catalogues show desk fans with spiders which might have been cut out from a sheet of metal.

By Mr. Church: Objected to as leading.

A. The spiders shown in the 1902 catalogue seem to indicate cast spiders similar to the one used in our Exhibit 51. The Peerless catalogue of 1907 also contains spiders of the same general character as the spider in our Exhibit 51. The Peerless catalogue of 1908 also indicates spiders of the same general character as in the Exhibit 51. In the Peerless Catalogue of 1910 I note a change in the
415 spider. In this case the spider seems to be made of stamped sheet metal. The appearance of the spider in the 1910 catalogue differs materially from the appearance of the spiders in the previous catalogues.

Plaintiff's counsel states that he has in his possession no copies of any other catalogues of either the Warren Electric & Specialty Company or the Peerless Company, or any reproductions of the same.

Direct Examination closed.

No cross-examination.

Deposition of Richard L. Binder.

Direct examination.

By Mr. Stackpole:

Q. 1. Please state your name, age, residence and occupation.
A. Richard L. Binder; fifty years old; 931 North Eighth Street, Philadelphia; dealer in special electrical supplies and manufacturer of waste reclaiming equipment I am president of the K. & B. Company, Philadelphia, manufacturers of baling presses and waste reclaiming equipment and dealers in special electrical supplies.

Q. 2. How long have you been in the business of electrical supplies?

A. Since 1894 or 1895.

Q. 3. During your experience in that business have you handled and sold electric desk fans?

A. Yes, sir.

Q. 4. During what periods?

A. Well, from 1898 to 1902 extensively, and since then as a sort of a side line to our other apparatus.

Q. 5. In 1898 by whom were you employed?

A. From 1898 until 1902 I was employed by Vallee Brothers Electrical Supplies Company, of Philadelphia.

Q. 6. What enables you to fix those dates?

A. In 1898 our plant was burned up, and the proposition was made to me by Vallee that instead of starting in business myself I come and associate myself with them. The proposition was accepted, and I entered into their employ. In 1902 I left them and engaged in business myself, incorporating the K. & B. Company.

416 Q. 7. During your experience in handling and selling electric Desk fans, did you ever handle a so-called Peerless fan?

A. Yes, sir. The Vallee Brothers were the district sales agent for that fan for the Warren Electric & Specialty Company.

Q. 8. And what did you personally have to do with handling and selling these Peerless fans?

A. Well, my position as a salesman was to find a market for some of the fans that Vallee handled; along with the other salesmen I sold them.

Q. 9. Do you recall any so-called cheap Peerless fans?

A. Yes, sir. Somewheres around 1900 or 1901 the Peerless people suggested that they get up a very low priced fan that would be sold as a competing fan on price only, and a conference of the Vallee salesmen was called to consider whether that would be a good move. It was determined to bring out a low priced fan with all of the fine finish taken off of it so as to reduce the cost of manufacture.

Q. 10. Did you handle and sell such low priced Peerless fans?

A. Yes, sir; they were brought out and put on the market.

Q. 11. Would you recognize an example of such Peerless cheap fans?

A. Yes; I am familiar with it and I believe could recognize it.

Q. 12. I show you Plaintiff's Exhibit 51; do you recognize this fan; and, if so, as what?

A. I would recognize that as a Peerless fan, and of that type of cheap fan that I have spoken of.

Q. 13. What are the special characteristics of this fan which enable you to identify it?

A. Well, all of the Peerless fans had the fluted base. That was a sort of a design that they adopted as a mark of their fans at that time. This particualr cheap fan was made up with

a rigid frame instead of a swiveling frame or a bracket top frame, and it was made with only one speed; and then, instead of having what was uniformly the polished blades, either brass or nickel finish, they brought them out with the black enameled blades. I have a recollection, too, in connection with that type of fan, that it was suggested and decided that it should not be marked Peerless, because they thought if they did it would kind of count against a better grade of fan that they were also making, and so these fans were put out without name plates on them.

417–419

Q. 14. I notice that Exhibit 51 lacks a name plate. Does this accord with your recollection of those fans?

A. Yes; I recollect very well that there was one of the points that was discussed in connection with that low priced fan.

Q. 15. Please examine this Exhibit 51, and in particular the nature of the blades and spiders and rivets, and state whether you recognize these features.

A. Yes, I can recognize those as being the generally adopted construction on the Peerless fan of that date.

Q. 16. Did you ever see a Peerless fan of that date which was different in these respects from Exhibit 51?

A. Never that I noted any different. At that time I can say the universal construction was to make the spider on which the blades were mounted of castings, and that was subject to breakage, a certain chance of breaking the spiders. In later years that was changed to make these spiders of stamped metal.

Q. 17. Does what you have just said apply to the Peerless fans?

A. Peerless fans and other fans also.

Q. 18. Did you ever see any Peerless fans of that period without rivet heads on the blades?

A. I never had any of my attention called to it in any way and have never made any note of it.

Q. 19. I show you a copy of the 1902 catalogue of the Warren Electric & Specialty Company. Do you recognize this catalogue?

A. Yes, sir, I recognize this as one of the types that they distributed to their various agents. We distributed lots of them ourselves. By we I mean Vallee Brothers.

Q. 20. Have you any interest in this controversy?

A. None whatever.

Direct examination closed.

No cross-examination.

PLAINTIFF'S EXHIBIT No. 5. HARMATTA PATENT IN SUIT.

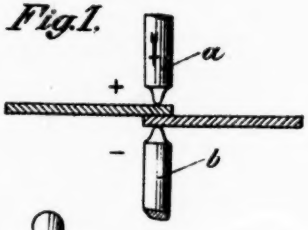
J. HARMATTA.

ELECTRIC WELDING.

APPLICATION FILED DEC. 3, 1908.

1,046,066. Patented Dec. 3, 1912.

Fig. 1.



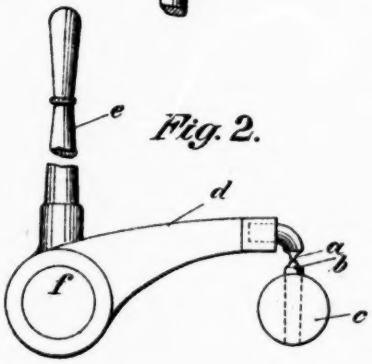


Fig. 2.

Fig. 3. *Fig. 4.*



Witnesses:
J. P. Britt
E. E. Duffy

Inventor:
Johann Harmatta
by Duffy & Dean
Attys.

UNITED STATES PATENT OFFICE.

JOHANN HARMATTA, OF SZEPESVÁRALJA, AUSTRIA-HUNGARY, ASSIGNOR TO THOMSON ELECTRIC WELDING COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ELECTRIC WELDING.

1,046,066. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed December 3, 1903. Serial No. 183,677.

To all whom it may concern:

Be it known that I, JOHANN HARMATTA, engineer, a subject of the King of Hungary, residing at Szepesváralja, in the Empire of Austria-Hungary, have invented new and useful Improvements in Electric Welding, of which the following is a specification.

My invention relates to the manufacture of metal articles of all kinds and consists in a novel method of fastening the component parts together by the process of electric welding and also in the new article produced thereby.

The invention affords a cheap and practical substitute for riveting and is particularly useful in fastening plates or sheets of metal to one another inasmuch as it may be employed for the thinner sheet metal, such for instance as is used for sheet metal ware like vessels or household utensils.

In general terms the invention may be stated to consist in fastening the pieces together by an electric weld at one or more distinct or well-defined spots, each of small area or extent, in their juxtaposed or opposite plane faces by the application of pressure and heating current localized in such spots, and in the special method of localizing the heating and the pressure in the spot or spots as hereinafter described and specified more particularly in the claims.

It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces. It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces.

A weld formed according to my invention is distinguished however from such prior welds, among other things, by the fact that the opposed surfaces available for uniting the pieces together and in which it might be possible to form a weld are welded in a small spot or spots only, the spot or spots being surrounded by comparatively large areas of opposed surfaces in which no weld is made.

By the term "electric welding" as used herein I mean that wellknown process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure, and I disclaim those processes of fastening pieces of metal together in which the parts are heated and practically melted down by an electric arc generated on the back of the piece by "drawing" an arc by means of the electrode, as well as other processes in which the welding heat is generated externally and electrically in a resistance material and is imparted to the work by heat conduction from said resistance material in contact with the work.

While it is possible, consistently with my invention, to localize the desired pressure and heating current at the desired distinct small spot or area in various ways, this may be accomplished conveniently by pressure applied over the spot and itself localized on the back of the plate or sheet immediately over the small spot in which the union is to be made by using a tool pressed against the work by its end and formed at such end so as to engage the work by a spot or area of small extent and serving, likewise, by preference, as the electrode which feeds the current into the work to heat the same. The member which feeds the electricity being thus at the same time the tool, in this manner the most favorable conditions of working possible are secured, since, as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough.

For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place of welding by the aid of any of those technical means which are suitable for produc-

ing or transmitting pressure, *e. g.*, with a press either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power, or by other means.

In the accompanying drawings, Figure 1 illustrates the application of my invention to the welding of two plates or sheets overlapped so as to be superposed or have a portion only of their meeting faces presented to one another and by the welding of the opposed surfaces intermittently or at certain spots only through applying pressure at a point or spot on the back of a plate over the spot of desired union. Fig. 2 is a side elevation of a welding device, also illustrated in part in Fig. 1. It shows the construction of the means which may be employed for pressing the elctrode against the work by manual power. Figs. 3 and 4 show forms which may be adopted for the ends of the electrodes where they engage the work.

Electrodes *a*, *b* are by preference both formed to engage the work by a small area of contact and may each be adapted to work on the smallest possible surface contact, so as to localize the pressure and the path of the heating current in a very small spot only. The lower electrode *b* may be inserted in a conductor *c* and forms one pole of the heating current, while the upper electrode is carried by an arm *d*, which can be turned on a shaft *f* by means of a hand lever *e*, and is connected with the opposite pole of the circuit feeding current to the work. By this means the electrode *a* may be caused to approach and recede from the electrode *b* and to exert pressure upon the back of the two superposed sheet-metal pieces introduced between the electrodes for the purpose of welding. The two superposed metal plates to be welded together being in position between the electrodes as indicated in Fig. 1, the operation is performed by firmly pressing the electrode *a* down upon the work with any required degree of pressure by means of the lever *e* and the circuit is closed by any suitable means, thus producing a flow of heating current through the work itself substantially localized therein so as to bring the same to the necessary welding temperature at the desired spot only, and the application of pressure by the use of the lever *e* will result in the welding of the plates together in the small sharply defined place of welding at the point or spot desired, which perfectly answers the purpose of a rivet. In this event, especially in the case of thin vessels which are not required to withstand great pressure, the pressure on the place of welding may at the right moment be exactly regulated or kept within the proper limits. Obviously, the operation may be repeated upon the work at another point if it is desired to join the pieces at a number of spots only.

The time or duration of pressure and heating and the amount of pressure as well as the volume of current for effecting the weld can be readily determined by experiment for different sizes or thicknesses of metal and as well understood in the art of electric welding to which my invention relates.

The operation is completed with the cutting off of the flow of current in the usual manner practiced in the art of electric welding and the withdrawal of pressure when desired to permit the work to be withdrawn from position between the electrodes.

Sheet metal work made by this process is readily distinguished from that made by prior processes by the comparative absence of burning, roughening or disintegration of the material on the back of the plate when the operation is carefully conducted. It further possesses the advantage that there are no rivet heads to mar the finish of the back or outer surfaces of the plate.

I am aware that it has been before proposed to fasten two sheets of metal together by electrically welding them over practically the whole area of their opposed or lapping surfaces. I am also aware of patent to H. F. A. Kleinschmidt No. 616,436, dated December 20th, 1898, and do not wish to be understood as claiming anything disclosed in said patent.

What I claim as my invention is:—

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and

passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

7. The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes, pressing said electrodes firmly together and closing the circuit, whereby a small, sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth.

8. The method of electrically welding two plates or sheets of metal together face to face between electrodes, consisting in restricting the area of contact of an electrode with said plates to a spot, passing a heating electric current from said electrode to the coöperating electrode through said spot to heat the work to welding temperature and applying pressure to the work in line with said spot to effect a welding of one plate to the other.

9. The herein described method of producing a welding temperature in a small distinct spot or point of the opposed surfaces of two plates of metal, consisting in applying pressure at a point or spot only at the back of a plate coinciding with the desired point or spot of welding, while the plates are assembled face to face, to localize the flow of current in the required point or spot in the meeting surfaces and passing an electric current through the plates in the line of the applied pressure to bring the material to welding temperature at the spot of welding by the resistance of the work to the passage of such current.

10. The method of electrically welding a piece of sheet metal at a small distinct spot or point in its plane surface to the face of another piece of metal, consisting in applying pressure at a small point or spot on the back of the sheet to localize the pressure and electrical heating of the work at a spot of electrical contact in the opposed surfaces of said pieces beneath the point of applied pressure, and passing an electric current from one to the other at the said spot of localized electrical contact to produce a welding temperature at said spot and maintaining the localized pressure to effect a welding at said spot.

11. The herein described method of welding two pieces of sheet metal together by a weld at a small spot only of their opposed surfaces, consisting in applying pressure localized in a spot on the back of a sheet directly over the desired spot of union, while said sheet is assembled face to face with the opposite sheet and so as to localize the pressure and electrical heating in a spot in the meeting surfaces of the sheets, and effecting the weld by passing an electrical current from one sheet to the other through said spot in the line of the localized applied pressure, and by pressure applied in said line.

12. The method of electrically welding two pieces of sheet metal to one another, consisting in pressing the sheets together by pressure applied and localized in a distinct well-defined point or spot on the rear surface of a sheet while passing an electric current through them in the line of the pressure, thereby localizing the path of the heating current from one to the other of the meeting surfaces of the sheets to cause the said sheets to be heated to welding temperature by the electric resistance of the work at said spot, and applying pressure localized over said spot whereby the pieces are welded together at a distinct well defined spot in their meeting surfaces answering the purpose of a rivet.

13. The method of electrically welding two plates of metal together face to face, consisting in pressing the plates together between two electrodes one of which at least makes contact with the rear of a plate at a spot only, feeding a heating electric current into the plates by said electrodes to bring the plates to welding temperature by the heating effect due to the electrical resistance of the portion of the circuit containing said plates, and effecting an electric welding of one plate to the other at a spot beneath the electrode by the pressure of said electrode.

14. The herein described method of fastening two sheets of metal together at a distinct point or spot only in their plane meeting surfaces, consisting in pressing the sheets together and localizing the contact pressure of each upon the other at the said distinct spot or point, passing an electric current from one sheet to the other through said localized spot of contact pressure between them to bring the metal to welding

temperature in said spot and thereupon completing the weld in the material so brought to welding temperature and uniting the pieces by a welded union at said spot only.

15. The herein described method of fastening two pieces or sheets of metal together at a spot only in their meeting surfaces, consisting in pressing them together at said spot, passing an electric current through said pieces or sheets at said spot to raise the same to welding temperature and applying welding pressure localized in the back of a sheet immediately over said spot to effect the weld.

16. The herein described method of welding two pieces of sheet metal together by pressing them together between electrodes engaging the surface of the sheets at a spot only and bringing the section of work between them to the welding temperature by its resistance to the passage of an electric current fed through the work by said electrodes.

17. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

18. Sheet metal work comprising pieces of sheet meal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

19. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

20. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

21. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

In witness whereof I have hereunto signed my name this 5th day of November, 1903, in the presence of two subscribing witnesses.

JOHANN HARMATTA.

Witnesses:
CARL BECKER,
T. LA GUARDIA

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

PLAINTIFF'S EXHIBIT No.19, De FERRANTI PATENT No.906,400.

S. Z. DE FERRANTI.

PROCESS FOR ATTACHING TURBINE BLADES TO THEIR CARRYING ELEMENTS.

APPLICATION FILED DEC. 16, 1905.

906,400. Patented Dec. 8, 1908.

3 SHEETS—SHEET 1.



Fig.1.



Fig.3.

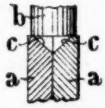


Fig.2.



Fig.4.



Fig.9.



Fig.10.



Fig.5.



Fig.6.

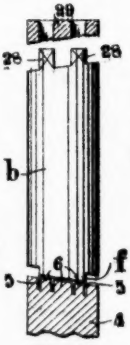


Fig.12.

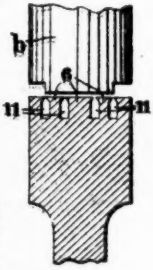


Fig.15.

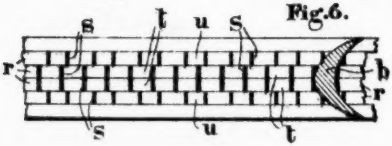


Fig.7.

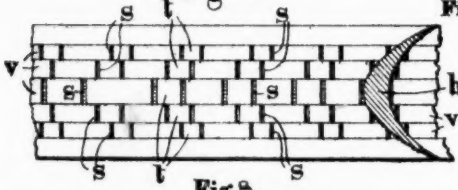


Fig.8.

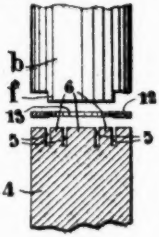


Fig.16.



Fig.17.

Attest:

Edward L. Polson

Edward N. Sarton

Inventor,

Sebastian Ziani de Ferranti,

By Dyer, Tuttle & Brownell,

Attys.

S. Z. DE FERRANTI. 429

PROCESS FOR ATTACHING TURBINE BLADES TO THEIR CARRYING ELEMENTS.

APPLICATION FILED DEC. 15, 1905.

906,400. Patented Dec. 8, 1908

3 SHEETS—SHEET 2

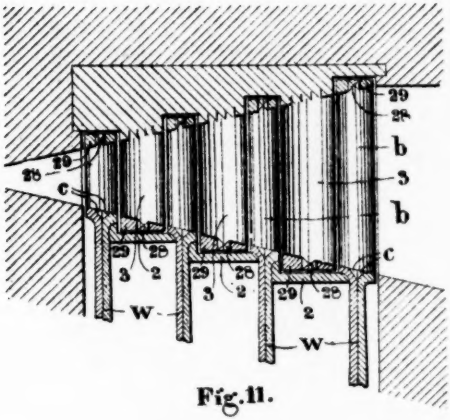


Fig. 11.

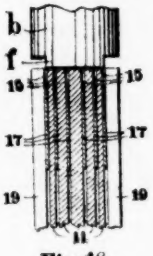


Fig. 18.

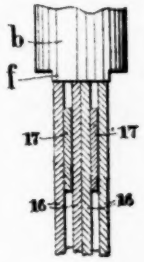


Fig. 19.

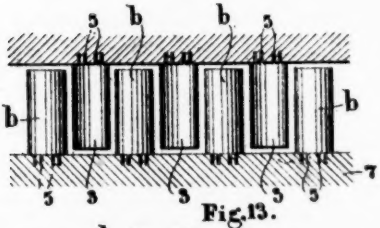


Fig. 13.

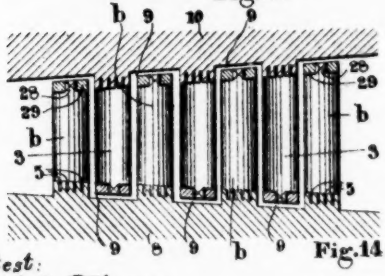


Fig. 14.

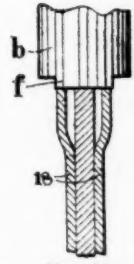


Fig. 20.

Attest:
Edward L. Folson
Edward N. Santee

Inventor.
Sebastian Ziani de Ferranti,
By Speer, Middleton, Dearborn & Speer
Attys

431

S. Z. DE FERRANTI.

PROCESS FOR ATTACHING TURBINE BLADES TO THEIR CARRYING ELEMENTS.

APPLICATION FILED DEC. 15, 1906.

906,400. Patented Dec. 8, 1908.

3 SHEETS—SHEET 3.

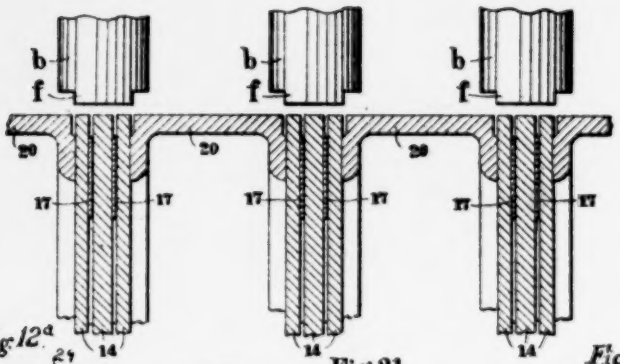
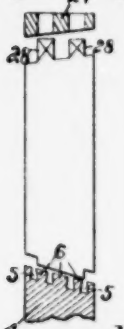


Fig. 12a. Fig. 21. Fig. 16a.



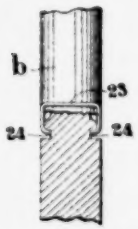


Fig. 22.



Fig. 23.



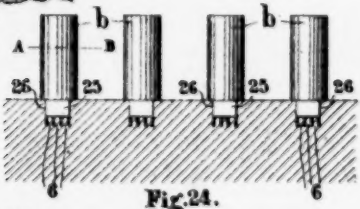


Fig. 24.

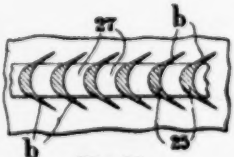


Fig. 25.

Attest:

Edward C. Tolson.
Edward N. Sartor

Inventor.

Sebastian Ziani de Ferranti

By Spear, Middleton, Donnelan & Spear

Attys.

UNITED STATES PATENT OFFICE.

SEBASTIAN ZIANI DE FERRANTI, OF HAMPSTEAD, LONDON, ENGLAND.

PROCESS FOR ATTACHING TURBINE-BLADES TO THEIR CARRYING ELEMENTS.

No. 906,400. Specification of Letters Patent. Patented Dec. 8, 1908.

Application filed December 15, 1905. Serial No. 291,933.

To all whom it may concern:

Be it known that I, SEBASTIAN ZIANI DE FERRANTI, a subject of the King of Great Britain and Ireland, and residing at 31 Lyndhurst road, Hampstead, London, N. W., England, have invented certain new and useful Improvements in Processes for Attaching Turbine-Blades to Their Carrying Elements, of which the following is a specification.

This invention relates to the welding of turbine blades on to the wheels, rings or drums carrying them and also to apparatus used in connection therewith.

The object of my present invention is to improve upon processes at present employed for electrically welding turbine blades to their carrying elements so as to obtain with greater certainty a stronger weld and therefore a better attachment of the blade.

A further object of my invention is to effect the weld with less disturbance of the neighboring metal so as to obtain a smooth passage through the blades.

It has heretofore been proposed to make the disk, ring or drum at the point at which each blade is welded of approximately the same section and conductivity as the blade itself. According to one method which has been proposed a wheel of rather less thickness at the rim than at the width of the blades is taken and grooves cut across the rim thus leaving teeth of the necessary section projecting therefrom on to which the blades were welded. This construction left the projecting teeth on to which the blade was welded of a different cross section from that of the blade itself, the metal in the neighborhood of the root of the welded blade being consequently rough and irregular and offering considerable frictional resistance to the passage of the working fluid. According to another method the blades are welded on to circumferentially formed rings in the rim of the wheel or other part on to which the welding was to be done; the passage between the blades in the neighborhood of the weld was however even more irregular according to this method than according to that described above.

Now the present invention consists in so forming the ends of the blades and the parts upon which they are welded that a smooth path of any desired form is made and that a weld of great strength not only in resisting centrifugal force but also tangential force is produced.

Referring now to the accompanying drawings which form part of the specification:—Figure 1 shows a developed edge view of part of a wheel built up of two disks, each provided with angled slits, Fig. 2 being a corresponding section taken on the line A B of Fig. 1, and Fig. 3 a part elevation looking on one of the adjacent faces of a disk; Fig. 4 shows an elevation of a turbine blade having a welding shank or tag; Figs. 5 and 6 correspond respectively to Figs. 1 and 2, the wheel however being built up of three disks instead of two; Fig. 7 is a developed edge view of part of a wheel built up of several disks of equal thickness assembled stepwise as regards the welding teeth. Fig. 8 being similar generally but showing a wheel built up of disks of different thickness; Fig. 9 shows a section through the rim portion of a wheel built up of two flanged disks, Fig. 10 being a similar view of a modified form in which a center disk is added to the above; Fig. 11 shows a multiple wheel built up of component wheels of the type shown in Fig. 9; Fig. 12 illustrates a method of welding in which circumferential grooves are cut in a wheel, while Fig. 12ª shows a modification of the wheel shown in Fig. 12 but with V-shaped grooves. Figs. 13 and 14 show the same plan adapted to multistage turbines having cylindrical and conical drums respectively; Fig. 15 shows a wheel in which the circumferential rings are burred or rolled over; Figs. 16 and 17 illustrate a method of welding in which a punched strip is interposed between the turbine wheel and blade; Fig. 16ª shows a modification of the method illustrated in Figs. 16 and 17, and in which an unperforated strip is interposed between the wheel and the blade. Figs. 18, 19 and 20 show wheels built up of disk portions of graded thickness and spaced at the edges so as to form circumferential grooves; Fig. 21 shows a drum built up of individual wheels having circumferential grooves; Fig. 22 shows a section through the rim portion of a turbine wheel in which strips are inserted between adjacent blades. Fig. 23 being a corresponding edge view showing a strip before bending over; Fig. 24 shows a form in which the welding takes place at the bottom of a comparatively deep groove, packing pieces being calked into this groove between adja-

cent blades, Fig. 25 is a corresponding part section taken on the line A B of Fig. 24.

I wish it to be understood that in order to avoid undue complexity in the drawings, they are to a large extent of a diagrammatic nature.

Where desirable the same reference symbols are used to denote corresponding parts in the different figures.

According to one method of carrying the invention into effect, (see Figs. 1 to 3) I make the wheel of two disks, *a*, *a*, of slightly more combined width at their rims than the width of the blades, *b*.

Across one circumferential corner or edge of each wheel disk, *a*, I cut grooves or slits, *c*, by means of a fine circular saw or other convenient means, the plane of each cut, (*i.e.*, the plane of the saw, if a saw is used) being inclined at an angle of 45° or thereabouts to the center plane of its wheel disk and intersecting this latter plane in a radial line. Consecutive cuts are put at an angle to each other as shown so that when the two wheel disks, *a*, which are cut right and left hand, are put together, the cuts mark off on the edges of the disks a series of parts, *d*, which approximate in shape to that portion of the root of the blade to be welded to them. The metal, *e*, of the wheel rim is not cut away between these parts, *d*, but is left standing, the rim thus consisting of partially cut "teeth", *d* and *e*, alternately disposed, the blades being welded to those marked *d*, while those marked *e* are left blank.

The blade ends I form by punching or other suitable means with a shank, *f*, (see Fig. 4) which may stand out from the body of the blade say one twentieth of an inch.

The blades when being welded are held in closely fitting jaws shaped to clear adjacent blades the blade being placed in the jaws so that only the shank, *f*, projects.

In cutting the tooth on to which, the welding takes place and in proportioning the end of the blade and the conductivity of the jaws which hold it, I am careful to arrange the various sections, sizes, and conductivities so that the tooth on to which welding is to take place is at first heated more rapidly than the shank of the blade. The effect of this and the above described arrangement is that the principal heating first takes place between the blade and the tooth, *i. e.*, on the surface of the part on to which welding is to be effected. A very considerable pressure is applied during the process, and this results, when the above arrangement is carried out, in the actual welding surface being forced into the wheel or other part and the surface of the wheel being left clean and smooth and untouched by the disturbing bur which takes place at the weld. Moreover, the forcing into the wheel of the blade shank spreads the metal under the heat of welding and largely fills up the saw cuts in the rim. This has the effect of allowing a good weld to be made with a fair amount of metal crushed out, which is a very desirable feature. It also makes the welded end of the blade fit the side of the grooves into which it is forced and so greatly supports the blade against side strain. So fully is this carried out in practice when the blade welding is done according to my present invention, that it is possible to hammer over the blades at right angles to their original position without cracking the metal of the weld, thus showing that great strength and rigidity are obtained according to the method of my present invention.

The arrangement above described as typical of my invention may be varied in many ways. Thus according to a modification, the wheel instead of being built up of two disks, *a*, as shown in Fig. 1, may be formed of three disks, (see Figs. 5 and 6)—a center one, *n*, which has slits, *o*, cut straight across the edge from face to face instead of at an angle and two side disks, *a*, disposed one on each side of the center one, *n*, to make up the thickness of the finished wheel as desired, the side disks being right and left hand and having grooves or slits, *c*, cut in them at an angle, as already described. The section, *d*, of the face of each "tooth" on to which the welding is to be effected approaches even more closely to the section of the blade according to this method than in the arrangement above described. The complete wheel may thus by an obvious extension of the method of the preceding paragraph be made up of any number of separate disks that is found convenient, provided that the above described methods are adhered to of separating those portions on to which the welding is to take place.

According to another method, when the wheel is built up of several disks instead of cutting some or all of the slits at an angle, each disk is provided with slits, such as those shown at *o*, Figs. 5 and 6, cut straight across the edge but in this case the width of the "teeth" on to which welding is to take place must be graded and stepped round so as to approximate as closely as possible to the section of the blade. Thus referring to Fig. 7, a wheel is indicated as built up of six disks, *r*, of equal thickness, the combined thickness of the central four being equal to the width of the blade shank. Cross slits, *s*, are cut as indicated so as to leave broad welding teeth, *t*, on the two central disks and narrower teeth, *u*, on the second and fifth disks. By assembling the disks in a stepped manner as shown, the welding surfaces can be arranged to follow closely the section of the blade. According to a modification of this method, (see Fig. 8) the disks, *v*, to which the blades are welded may conveniently be made of dif-

ferent thicknesses and assembled in a symmetrical manner with the thickest in the middle, the thicknesses of succeeding plates decreasing towards the sides. The disks are provided with cross slits, *s*, as before so as to leave welding teeth, *t*, of different widths. By thus combining disks of different thicknesses with welding teeth of different breadths arranged in a stepped manner, it is easy with straight cross grooving to provide an isolated welding surface which approximates very closely to the shape desired.

According to another modification of the above described methods, where I desire to weld on to a smooth face of either cylindrical or conical section and where owing to the moderate speed of the turbine the disks can be made of thin metal, I form the wheel, (see Fig. 9) of say two disks, *w*, which are dished at the rims so as to provide flanges, *x*, or in other words, they are turned over from the form of a disk into the form of a cylinder at the rims. Two disks thus formed are put together as shown in Fig. 9 with the disk parts touching and cylindrical parts, *i. e.*, the flanges, *x*, projecting outwards. The surface thus presented is grooved from the center dividing line outwards towards the edges of the cylindrical portion, the grooves or slits, *c*, being cut at an angle so as to isolate portions of the faces where the welding is to be done in a manner precisely similar to that already described above with reference to Figs. 1 to 3. This method, for example, may be carried into effect with two disks each of say one tenth of an inch in thickness and turned over sufficiently round the periphery to present a surface half an inch in width to correspond to the width of the blades.

The method just described may itself be modified by making the wheel of three thin disks, namely a central one, Z, and two side ones bent over as above described, (see Fig. 10), the center one being provided with slits, *c*, cut straight across the edge as in the form described with reference to Figs. 5 and 6, and the side disks being cut at an angle through a circumferential corner as before. The welding then takes place across the edges of all three disks.

When multiple wheels of this description are built to go on a shaft, the spaces in between the rims (see Fig. 11) may be filled up with circumferential rings, 2, of channel section or the like into which the shrouded ends of the standing blades, 3, project thus forming an effective guard and preventing undue friction with the working fluid. The shrouding ring of the running and the standing blades may be attached by any of the well known methods.

According to another method I weld the blades upon wheels, rings, or drums, the welding surface of which is cut up into rings by means of circumferential grooves of the desired width and spacing run round about them: but, unlike the arrangement of my previous invention, I leave a smooth face with comparatively narrow grooves cut in them, and I also grade the width of the circumferential rings which are left between the grooves in such a way that the surface presented under each part of the blade is approximately of the same width as the surface at right angles of the blades, *i. e.*, the thickness of the blades, at each part. Moreover, I form the blade with a projecting shank as already described herein, and carry it in jaws as already described. Welding may then be most satisfactorily effected between the blade shank and the ring surface, the shank of the blade being forced into this and a smooth path being left between the blades, any little disturbance on the surface, due to the weld, being flattened by the jaws, which are flush with the end of the blade proper and which come in contact with the surface on to which the welding is done, but only after the current has been automatically cut off. Thus referring to Fig. 12, the rim portion of a wheel, 4, is shown having circumferential grooves or slits, 5, separating continuous rings of metal, 6, of graded thicknesses as explained above. A blade, *b* having a welding shank, *f*, is shown in the figure in a position, closely adjoining the prepared wheel rim, a shrouding ring, 29, being attached by any known method. The welding may be effected on to any number of the circumferential rings, 6, and these may have any desired graded widths to suit the particular case in point as explained above. It is convenient to cut four circumferential slits, 5, thus leaving three rings, 6, on to which to weld, a central wide one and a narrower one on each side, the exterior rings against which the cut ends of the blade butt when pressed home not being used for welding.

Referring to Fig. 13, the circumferential groove method is shown applied to both the running blades, *b*, and the standing blades, 3, of a multistage turbine having a cylindrical drum, 7, while in Fig. 14, a conical drum, 8, is shown all the blades being provided with shrouding rings; in this latter case, however, I prefer to cut grooves or recesses, 9, into which the shrouding rings on the standing and the running blades may enter both in the conical drum, 8, and in the casing, 10, respectively.

Where I desire to get a still smoother face, *i. e.*, rim surface, than is obtained with the plain circumferential grooving on to which the tag or shank of the blade is welded, I may, after providing the wheel or the like with grooves, 11, as before (see Fig. 15), roll its surface, *i. e.*, the surface of the rings, 6, formed on the wheel, so as to close the grooves over, although the inner part of the slot remains and so insulates the heat that

welding takes place satisfactorily as already explained. In order to facilitate the burring over of the surface of the rings, 6, I may make the grooves of V section Fig. 12ª instead of the section shown in Fig. 12. When the burring roller is then applied, the metal spreads out more readily so as to close over the grooves; after the rolling, the wheel may have its surface machined or ground so, as to finish it.

According to another method I obtain a smoother passage between the root portions of the blades by means of covering the ringed surface or edge of a wheel prepared as shown in Fig. 12 with a thin strip of metal, 12, continuous or in sections (see Figs. 16 and 17) out of which holes, 13, are punched of a similar shape to but larger than the cross section of the tag or shank of the blade. The tags, *f*, are then put through the punched holes, 13, in the strip direct on to the circumferential rings, 6, for welding. The tag is made rather longer according to this process and the edges of the blades coming down on to the side portions of the strip hold it in position apart from any attachment which is obtained by the fusing together of the parts in welding.

According to another method Fig. 16ª, I may cover the circumferential grooves with a very thin strip of metal, such as that numbered 12 in Fig. 16, but without holes punched in it; the welding is then effected just in the same way as though the strip was not present. Special care must be taken when working according to this method as regards the proportioning of the opposing sections and the adjusting of the welding current so that the parts may be satisfactorily welded together.

According to a modification of the circumferential grooving method, I may form the wheels of disks, 14, put side by side (see Fig. 18) with spaces 15, in between them which correspond to the grooves or slits, 5, already described above. The thickness of metal between the spaces, 15, are so proportioned that their section is suitable for welding in relation to the section of the blade at the particular part concerned. I may accomplish this either by adopting individual disks of different thicknesses as shown in Fig. 18 or I may use disks, 16, of the same thickness as shown in Fig. 19, and group them together so as to give the effect desired.

The individual disks may either be assembled with intervening packing rings or distance pieces, 17, as shown in Figs. 18 and 19 or the outer disks, 18, may be dished as in Fig. 20. I form the blades with shanks and hold them in jaws as already described, the welding then being effected in a most satisfactory manner. Additional disks, 19, as shown in Fig. 18, may be put on each side of the wheel in the first instance or afterwards; these disks are of the same diameter as those on which the blade shank is actually welded but owing to this projecting shank and the cutting away of the other part of the blade end, welding does not take place on to these additional disks and they merely act as shrouds. Or according to a modified arrangement as shown in Fig. 21, I may fasten rings, 20, in between the peripheries of the circumferentially grooved wheels in such a manner that a smooth or grooved path is formed circumferentially in between the blade ends thus giving the structure the external appearance of a drum. I may so form and assemble the component parts of the complete drum according to this modification that the welding takes place on a conical surface as in Fig. 11, the path through the blades taken by the working fluid then expanding in area so as to allow for the change in velocity of the fluid as it does work.

I deal with any irregular surface that may be left after welding by means of stampings 23, (see Figs. 22 and 23) which are put in between each pair of adjacent blades; the ends of these stampings are turned over and pressed into grooves, 24, cut round each side of the wheel rim as shown. It will be evident that according to this method the path traversed by the working fluid between the blades may either remain constant in area as in Fig. 13 or expand as in Fig. 14.

According to another method, (see Figs. 24 and 25), I may form the blades with long shanks, 25, say ¼ inch or thereabouts and weld these shanks on to circumferential rings, 6, formed at the bottom of grooves, 26, running round the drum or the like in positions corresponding to the rings of blades to be welded. In this case the welding jaws not only entirely contain the blades but also about 3/16 inch of the blade shank. Welding is then effected as already described on to the projecting rings, 6, within the main groove, 26, the edges of the blades left from the cutting of the shank coming down into contact with the surface of the wheel or drum on to which the welding is done. After the welding is complete, packing pieces, 27, formed to the shape of the blades on two sides and to the width of the main groove, 26, on the other two sides are pressed in between the blades into the main groove and are then held in position by means of caulking, the caulked packing piece adding to the tangential stiffness and the weld at the bottom of the groove absolutely insuring the holding of the blade in position.

All the blades already described may have their ends cut either square or oblique to their length and where the blades are short as for certain purposes, the smooth ends, i. e., the ends remote from the blade carrier

may be left unsupported, this method of construction being satisfactory owing to the great strength of fixing afforded by all the methods described according to this invention.

I wish it to be understood that the examples of welded blade carrying members hereinbefore described are to be regarded as illustrative of my invention and not in any way limiting the scope thereof as it is evident that other modifications will readily suggest themselves to persons in the art.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A process for welding turbine blades to their carriers consisting in adjusting the relative heat capacities of the parts to be welded so that the welding part of the carrier is heated more quickly than that of the blade, and forcing the weld formed between said parts underneath the surface of said carrying member.

2. A process for welding turbine blades to their carriers consisting in partially isolating the welding parts of the carrier from the main portion thereof and forcing the weld formed between the blade and such isolated parts underneath the surface of said parts, as set forth.

3. A process for welding turbine blades to their carriers consisting in partially isolating the welding parts of the carrier from the main portion thereof by circumferential grooves and forcing the weld formed between the blade and said isolated parts underneath the surface of said parts, as set forth.

4. A process for welding turbine blades to their carriers consisting in partially isolating the welding parts of the carrier from the main portion thereof by transverse slits, the surface so isolated approximating in section to that of the blades to be attached thereto and forcing the weld formed between the blade and said isolated parts underneath the surface of said parts, as set forth.

5. A process for welding turbine blades to their carriers consisting in partially isolating the welding parts of the carrier from the main portion thereof and forcing the weld formed between the blade and the said isolated parts underneath the surface of said parts so that the metal crushed out during welding is incorporated with the parts of the carrier contiguous to said welding parts, as set forth.

6. A process for welding turbine blades to their carriers consisting in partially isolating the welding parts of the carrier from the main portion thereof by cutting transverse slits in the disk members forming said carrier the said isolated parts approximating in cross section to that of the blades to be attached to said carrier and forcing the weld formed between the blade and said isolated welding parts underneath the surface of said welding parts.

7. A process for welding turbine blades to their carriers consisting in partially isolating the welding parts of the carrier by spacing the disk members forming said carrier and forcing the weld formed between the blade and said carrier, underneath the surface of said carrier.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

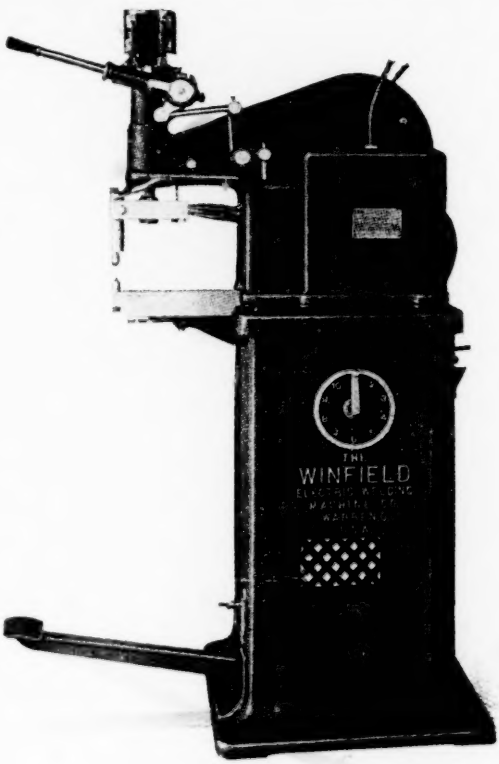
SEBASTIAN ZIANI DE FERRANTI.

Witnesses:

ALBERT E. BARKER,

BERTRAM H. MATTHEWS.

PLAINTIFF'S EXHIBIT No. 1.



Exhibits.

PLAINTIFF'S EXHIBIT No. 6.—TITLE PAPER OF HARMATTA PATENT IN SUIT. H. F. L., N. P. & Sp. Ex.

MEMORANDUM OF AGREEMENT BETWEEN THOMSON ELECTRIC WELDING COMPANY AND UNIVERSAL ELECTRIC WELDING COMPANY.

June 17th, 1909.

It is agreed that the interference which has been declared in the United States Patent Office between the application of Adolph F. Rietzel, Serial Number 247,081, owned by the Thomson Electric Welding Company, and the application of Lawrence S. Lachman, Serial Number 233,109, owned by the Universal Electric Welding Company, shall be dissolved by the withdrawal of the claims in interference of the said application of Lachman or a concession of priority by Lachman or such other arrangement as counsel shall deem best and that a patent may issue forthwith on the application of Rietzel. The above agreement is made because of the conviction of the parties that said Rietzel and not said Lachman is entitled to said patent.

Upon the issue of such patent to Rietzel, the parties will enter into a contract in the form hereto annexed marked "Exhibit 1".

THOMSON ELECTRIC WELDING COMPANY [SEAL]
By B. F. Spinney, Pres't.

Attest: W. H. Hodges, Secy. & Treas.

UNIVERSAL ELECTRIC WELDING COMPANY [SEAL]
By M. Lachman, President.

Attest: Reginald Hawley.

"EXHIBIT 1".

This agreement made this 20th day of July, 1909, by and between the Thomson Electric Welding Company of Lynn, a Massachusetts corporation, party of the first part, and the Universal Electric Welding Company of New York City, a corporation duly organized under the laws of the State of New York (formerly the Standard Pulley Manufacturing Company) party of the second part: Witnesseth:

That whereas the parties hereto entered into an agreement on the 26th day of February, 1909, a copy whereof is hereto annexed marked "A", and whereas the parties desire to amend said agreement;

Now, therefore, in consideration of one dollar by each party to the other paid, the receipt whereof is hereby acknowledged, and of the mutual covenants herein contained, it is agreed as follows, to wit:

In case of the termination of said agreement of February 26, 1909, by default of the party of the second part, that is to say, by reason of the neglect or refusal of the party of the second part to perform and observe any or all of the agreements, terms and conditions in said agreement contained, the party of the first part, in addition to all the rights accruing to it by said agreement and in particular by clauses 16 and 17 thereof, shall have the further right to collect from any and all sub-lessees of the party of the second part all royalties due from said sub-lessees to the party of the second part from and after the time when said agreement is terminated as aforesaid, as and when the same shall become due under the several agreements of the party of the second part with said sub-lessees. The party of the second part hereby irrevocably constitutes and appoints the party of the first part its attorney in its name and stead to collect all said royalties thereafter becoming due from any and all sub-lessees, and covenants and agrees that it itself will not interfere in any way with the collection of such royalties, and hereby authorizes and empowers the party of the first part to sue for and collect the same, using the name of the party of the second part, if necessary therefor. Out of all royalties so collected from its sub-lessees by the party of the first part, it, the party of the first part, shall retain for its own use so much thereof as is required to pay to it all sums due it from said party of the second part under said contract of February 26, 1909, together with the expense, if any, of collecting the same, and the party of the first part shall pay over the balance so collected to the party of the second part, its successors, assigns or legal representatives.

It is further agreed that the machines which are the subject matter of said contract of February 26, 1909, shall each bear upon the name plate thereof the inscription "Property of the Thomson Elec-

tric Welding Company, leased by the Universal Electric Welding Company".

The party of the second part covenants to vigorously push the business of leasing machines made under the patents of the parties hereto as provided in said agreement of February 26, 1909, and to devote its best efforts to developing and increasing said business.

The party of the second part further agrees that in each and every case in which it shall sub-let a machine owned by the party of the first part to a sub-lessee, it will make with such sub-lessee a contract of the form hereto annexed marked "B", and that it will in no case agree to accept from any sub-lessee a less royalty for a machine than that which the party of the second part is to pay to the party of the first part on said machines.

The party of the first part further agrees that the party of the second part may state in its leases to its sub-lessees that it, the party of the second part, "controls" United States Letters Patent No. 928,701 to the Thomson Electric Welding Company, assignee of Adolph F. Rietzel.

Said agreement of February 26, 1909, except as hereby amended, shall remain in full force and effect.

The provisions of this agreement shall be binding upon and inure to the benefit of the parties, their successors and assigns.

In Witness Whereof the Thomson Electric Welding Company has caused its name to be signed and its corporate seal to be hereto affixed by B. F. Spinney, its president, thereunto duly authorized; and the Universal Electric Welding Company has caused its name to be signed and its corporate seal to be hereto affixed by M. Lachman, its president thereunto duly authorized.

THOMSON ELECTRIC WELDING COMPANY,

[Seal] B. F. Spinney, President.

Attest: W. H. Hodges.

UNIVERSAL ELECTRIC WELDING COMPANY,

[Seal] M. Lachman, President.

Attest: Reginald Hawley.

Exhibit A.

This agreement made this twenty-sixth (26th) day of February 1909, by and between the Thomson Electric Welding Company of

Lynn, Massachusetts, a Massachusetts corporation, party of the first part, and the Universal Electric Welding Company, of New York, New York, a New York State corporation (formerly the Standard Pulley Manufacturing Company), party of the second part witnesseth:

Whereas, The parties to this agreement severally own or control United States patents relating either to that branch of the art, or to machines and devices used in that branch of the art of electric welding, known as point or spot welding, and own or have the right to use sundry other inventions relating to said point or spot welding or to machines and devices used in connection therewith, some of which inventions form the subject of applications for Letters Patent of the United States already filed; and the parties hereto severally propose to apply for and secure Letters Patent of the United States on other similar inventions relating to said point or spot welding and to machines and devices used therein; and

Whereas, The parties to this agreement desire to combine their interests under said patents, inventions, applications, machines and devices, and to continue this contract as long as there are any patents or inventions of either party, relating to the art of point or spot welding or to machines and devices for use in connection therewith, and thereafter as long as the second party is able to continue to grant licenses to use the art and to sub-lease or make any other equally profitable disposition of machines and devices for point or spot welding; and

Whereas, the first party has heretofore leased certain electric welding machines, apparatus and appurtenances to the second party, and certain contracts and agreements relating to said point or spot welding were heretofore on November 15, 1904; March 15, 1905; November 3, 1905; November 27, 1905; January 1, 1906; November 13, 1906; and December 1, 1906, duly made and entered into between the said Thomson Electric Welding Company and the Standard Pulley Manufacturing Company (now the Universal Electric Welding Company); and

Whereas, the parties to this agreement are desirous of abrogating each and all of said agreements (except in so far as is provided by Clause 21), and in lieu thereof, desire to adopt a new agreement which shall consolidate and embody the substantial features of said

prior agreements, or some of them, in so far as the same are now in full force and effect.

Now therefore, in consideration of the mutual covenants and agreements herein contained, the parties to this agreement do hereby covenant and agree as follows:

1. All electric welding machines, apparatus and appurtenances heretofore leased by the first party to the second party shall continue to be leased by the second party from the first party. The word "machines" hereinafter used, is intended to mean "electric welding machines, apparatus and appurtenances".

2. The second party shall pay the first party a continuing annual rental, payable in quarterly instalments in January, April, July and October, of each and every year during the continuance of this lease, in the following amounts, to wit:

On each hand welding machine heretofore installed or to be hereafter installed, one hundred dollars ($100).

On each semi-automatic welding machine run by belt, heretofore installed or to be hereafter installed, one hundred twenty-five dollars ($125).

On each full automatic feeding and ejecting welding machine heretofore installed or to be hereafter installed, one hundred fifty dollars ($150).

3. The first party shall promptly furnish the second party with any and all point or spot machines which may be required by the second party, from time to time, and shall charge a reasonable price therefor; payment to be made promptly upon installation and acceptance.

4. The second party shall, during the continuance of this contract, obtain exclusively from the first party all machines, unless the first party in writing gives permission to the second party to build any special machines.

5. All machines used by the second party, pursuant to the terms and conditions of this agreement, whether said machines be obtained by the second party from the first party, or whether they be built by the second party, shall severally be subject to the payment by the second party to the first party, of the annual royalties hereinabove provided for.

6. All machines heretofore installed or that may hereafter be

installed by the first party for the benefit of the second party, may be sub-leased and let by the second party to any person, firm or corporation in any locality in the United States; but said machines shall, nevertheless, be subject to all the conditions and covenants of this lease when sub-leased and let, the same as if they were used by the second party.

7. In case any of said machines shall be sub-leased by the second party, said sub-letting shall be at all times subject to the condition that such sub-lessee shall not add to or substract from said machines any mechanism whatsoever; nor shall said sub-lessee make or allow to be made any change or alteration in the same without the consent thereto in writing of the first party.

8. The first party further covenants and agrees with the second party that in those cases where the second party has sub-leased to third parties any machines under the terms and conditions of this agreement, and such machines have been surrendered to the second party by said sub-lessees, and are no longer in use either by the second party or by its sub-lessees, thereupon and so long as said machines are so held by the second party and shall not be in use, the second party shall not be liable to the first party for the payment of any royalty thereon under the terms and conditions of this agreement.

9. Any machines required by the second party for butt or end-to-end welding, shall, when installed, be subject to all the conditions of this agreement, the same as if they were for point or spot welding.

10. The second party shall notify the first party promptly in writing upon the installation of a machine, of its location and the name of the person, firm or corporation to whom sub-leased, and also promptly notify the first party in writing of any change in location of sub-lessee.

11. All machines heretofore leased, as well as all subsequent machines leased under the conditions of this agreement, shall be entered by number, type and description, in the Schedule hereto annexed and made a part of this agreement.

12. The first party hereby grants to the second party the exclusive right to use for point or spot welding within the United States during the life of this agreement, any and all inventions and pat-

ents relating to the art of point or spot welding, now or hereafter owned or controlled by the first party, and also the exclusive right to use any and all machines for point or spot welding built by it or with its permission. Nothing in this is intended to restrict the first party in butt or end-to-end welding.

13. The first party hereby grants unto the second party the right to use at any time and in any place in the United States, in connection with the operation of said machines, any invention or process capable of use in connection with the art of Point or Spot welding, now or hereafter owned or controlled by the first party.

14. The first party further covenants and agrees that it will without expense to the second party, in all reasonable ways as occasion may offer, assist the second party in the obtaining of contracts for electrical Spot or Point welding.

15. The parties to this agreement hereby covenant and agree by and with each other that they will never at any time during the term of any Letters Patent issued to either of said parties, relating to the art of electric welding or to machines to be used in connection therewith, contest or question the validity of the same, or the sufficiency of either the specifications or the title of the owner thereof.

16. It is further covenanted and agreed that in case the second party neglects or refuses to perform and observe any or all of the agreements, terms and conditions herein contained, the first party shall have the right to terminate this agreement by giving to the second party six (6) months' notice in writing of its election so to do; and if the second party then fails to repair and make good such default or defaults on account of which the notice is given, on or before the expiration of said six months, this agreement and all rights of the second party hereunder shall be wholly at an end, and the first party shall be forthwith released from all its obligations thereunder. But the second party shall not thereby be released from liability to pay the annual rentals on machines, at the rate hereinbefore set forth, already accrued at the termination of said agreement.

17. Upon the termination of this agreement as aforesaid, all machines that may have been installed by the first party for the benefit of the second party shall be released and discharged from this

lease, and the right of possession thereof shall immediately revest in and be restored to the first party, who, by itself or its agents, may enter the premises of the second party or of the latter's sub-lessee, and upon the premises of all persons claiming under the second party, and take or remove the machines without being guilty of trespass or tort; or, the first party may pursue its proper remedies at law or in equity against the second party or against any sub-lessee of the latter, or the persons in whose possession the machines or any parts thereof may be found. And on the termination of this agreement for any default or breach, the second party shall have no claim or right to the repayment by the first party of the whole or any part of any sum which the second party may have paid to the first party under the terms and conditions of this agreement.

18. This agreement shall continue and be in full force and effect until the expiration of the last patent of the United States, now or hereafter owned or controlled by one of the parties to this agreement, relating to said Point or Spot welding or to machines used in connection therewith; it shall likewise continue so long as the second party sub-leases said machines or makes any other equally profitable disposition of machines for Point or Spot welding.

19. The first party further covenants and agrees that if the second party shall have fully complied with all the terms and conditions in this agreement set forth, but not otherwise, then, upon the expiration of this agreement, the second party shall have the privilege of purchasing said machines from the first party by the payment therefor of one dollar ($1); and that upon such purchase, the first party will transfer the property in said machines to the second party by proper bill of sale.

20. All the rights, interests, obligations and remedies, either vested in or imposed upon either of the parties to this agreement, shall be deemed to respectively belong to and be enforceable by the successors and assigns of either of the parties to this agreement.

21. It is hereby stipulated and agreed that whereas under the above mentioned contracts dated November 15, 1904, March 15, 1905, November 3, 1905, November 27, 1905, January 1, 1906, November 13, 1906, and December 1, 1906, certain rights have been granted to the American Pulley Company of Philadelphia,

Pennsylvania, the American Fork & Hoe Company, of Cleveland, Ohio, and the American Electric Welding Company, of New York, N. Y., said rights shall not be affected or impaired by the substitution of this contract for the aforesaid prior contracts, and the rights and obligations of the parties hereto, arising out of and in respect to the rights granted to the three companies above named, shall continue to be governed by the aforesaid prior contracts as fully and completely as if this contract had not been made; except as thus provided, said prior contracts shall not remain in force and are superseded by this present contract.

In witness whereof, the parties of the first and second parts have caused this agreement to be signed by their respective Presidents, and their corporate seals to be hereunto affixed, attested by their respective Secretaries, the day and year first above written.

THOMSON ELECTRIC WELDING COMPANY,

[Seal] By B. F. Spinney, President.

Attest: W. O. Dodge, Secretary

Party of the first part.

UNIVERSAL ELECTRIC WELDING COMPANY,

[Seal] By M. Lachman, President.

Attest: Reginald Hawley, Secretary,

Party of the second part.

State of Massachusetts,

County of Essex, ss.

On this 26th day of February, 1909, before me personally came Benjamin F. Spinney the President of the Thomson Electric Welding Company, with whom I am personally acquainted, who, being by me duly sworn, said that he resided in the City of Lynn, Mass., that he was the President of the Thomson Electric Welding Company, that he knew the corporate seal of said Thomson Electric Welding Company; that the seal affixed to the said instrument was such corporate seal; that it was affixed by order of the Board of Directors of said Thomson Electric Welding Company; and that he signed his name thereto by like order as president of said Thomson Electric Welding Company. WM. H. BATES,

[Seal] Notary Public.

State of New York,

County of New York, ss.

On this 27th day of Feby 1909, before me personally came Maurice Lachman, the President of the Universal Electric Welding Company, with whom I am personally acquainted, who, being by me duly sworn, said that he resided in the city of New York, that he was the President of the Universal Electric Welding Company; that the seal affixed to said instrument was such corporate seal; that he signed his name thereto by like order as President of the said Universal Electric Welding Company.

ALEX. B. WRIGHT,

[Seal] Notary Public. N. Y. Co. 420.

Following is the Schedule hereinbefore referred to: —

Schedule.

Numbers.	Marks.	Description.

Exhibit B.

This agreement, lease and license made this day of 1909, by and between the Universal Electric Welding Company, a corporation duly organized and existing under the laws of the State of New York, hereinafter called the "Lessor", and a corporation duly organized and existing under the laws of the State of hereinafter called the "Lessee", witnesseth,

Whereas the lessor is engaged in the development of the art of electric welding, owns certain letters patent and inventions pertaining to said art, and controls certain other letters patent owned by the Thomson Electric Welding Company, among which is included letters patent, No. to Thomson Electric Welding Company, assignee of Adolph F. Rietzel, and

Whereas, the Lessee desires to acquire the right to use in the practice of said art, welders furnished by the Lessor, specified in the schedule hereinafter contained, for the purpose hereinafter named, and for that purpose only at the Lessee's factory at

Now, therefore, in consideration of the premises and the mutual promises hereinafter contained; it is agreed as follows:

1. The Lessor shall ship to the Lessee the welder specified in said schedule in about from receipt of this agreement duly exe-

cuted by the Lessee. The Lessee hereby authorizes the Lessor to insert the numbers of the welder shipped and such other description thereof as may be necessary in the schedule hereinafter mentioned after the welder has been shipped.

2. The Lessee agrees to furnish a single phase, 20,000 watts, 60 cycles, alternating current at 220 volts, to said welter, and to furnish additional adequate current for additional welders when installed, and to do all the necessary wiring according to the directions of the Lessor.

3. The Lessee agrees to pay the freight and forwarding charges to its factory and to assume the risk of any loss or damage to the welder by fire or other casualty (but shall not be liable for ordinary wear) and to pay any such loss or damage forthwith to the Lessor, until the welder is accepted and the initial rental paid.

4. The Lessee agrees to pay the Lessor for initial rental as set out in the schedule, thirty days after shipment of the welder from the Lessor's factory, and the Lessor does hereby lease and let to the Lessee from and after receipt of said initial rental by the Lessor, subject, however, to the terms and conditions of the agreement, the welder specified in the schedule hereinafter contained, this lease and license to continue in force until the expiration of all patents which the lessor owns or controls embodied in the machine or involved in its use or the result of its use.

5. The Lessee in addition to the above mentioned initial rental, agrees to pay the Lessor as continuing rental to the royalty the sum of annually, in quarterly instalments of each, January, April, July and October first of each and every year during the continuance of this lease and license.

6. Said welder is leased for use in the Lessee's factory at for the sole purpose of welding by electricity the following articles, to be made in the Lessee's factory, to wit: —
all as more particularly set out in the catalogue of the Lessee herein annexed and made a part of this agreement.

It is understood by the Lessee that the Lessor has heretofore leased and licensed to other parties similar welders for the welding by electricity of articles other than the above.

It being further understood by the Lessee that this lease and

license is not an exclusive lease or license for the welding of the articles above named.

It is further agreed in this connection that the Lessee shall not weld by means of said welder any articles other than those named above, unless by the written permission of the Lessor, and in case the Lessor does so grant permission to weld articles other than those named above, the Lessee shall discontinue the same at any time if requested by the Lessor.

7. The Lessee agrees not to permit the removal or defacing of any dates, numbers or inscriptions now or hereafter impressed on said welder or affixed thereto by the Lessor. The Lessee shall not permit the machine to be moved from its factory at without notice in writing in advance thereof of such removal to the Lessor and then only for use by the Lessee at some suitable place within the United States.

8. Any additional welders which the Lessee shall elect to obtain of the Lessor shall be subject to all the conditions of this lease, the same as the welder originally installed hereunder, except as to the amount of initial rental and continuing rental or royalty which shall be agreed at the time of ordering said welders, and the numbers, marks, description, initial rental, annual rental or royalty, and the purpose for which said welders are to be used shall be entered in each such schedule; and the Lessee covenants and agrees not to use or permit others to use said additional welders or any part or parts thereof for any other purpose.

9. The Lessor and its agents shall at all reasonable times have convenient access to any welder subject hereto, with the right to examine and inspect the same and the use thereof.

10. Following is the schedule hereinbefore referred to: —

Schedule.

No.	Marks.	Initial Rental	Annual Rental or Royalty	Description and Use.

11. At any time during the continuance of this lease after six (6) months notification, the Lessee may return any welder subject hereto, and upon payment to the Lessor of all sums due and accrued to the date of its return said welder may be released from this instrument, and upon the return as aforesaid, of all the welders hereunder and payment of all sums due thereof as aforesaid, this lease

shall be at an end, and all obligations of the parties hereto shall cease and terminate. Should any welder be totally destroyed by fire, or any other casualty so that no identifying parts thereof can be returned as above provided, then said welder shall be released from this instrument upon satisfactory proof of such destruction and the payment to the Lessor of all sums due and accrued to the date of said destruction, and upon proof of the destruction of all the welders, this lease shall likewise come to an end, upon the payment to the Lessor of all sums due and accrued under it to the date of said destruction.

12. It is understood that the welders are the subject of Letters Patent of the United States which the Lessor owns or controls, and the Lessee covenants and agrees not to duplicate said machines without the consent in writing of the Lessor.

13. This lease and license is personal to the Lessee herein named, and shall not be assigned by the Lessee without the consent in writing of the Lessor. But if the Lessee is not in default in any of the provisions of this instrument, the Lessor will upon written request, consent in writing to the assignment or transfer of the same to any person in the United States believed by the Lessor to be responsible, provided such party accepts this lease and license, and agrees in writing to faithfully keep and observe all the provisions and agreements hereof, the same as though it had been the party originally named as Lessee, in this instrument, or execute a new lease if the Lessor desires. Upon obtaining the Lessor's said consent and upon the execution and delivery to the Lessee of such acceptance and written agreement or new lease, all obligations of the Lessee herein named shall cease and terminate. But such assignment shall not be made until the Lessor shall have determined to its satisfaction that the proposed assignee is in fact responsible, and shall have so notified the Lessee.

14. The Lessee shall not sell or attempt to sell any welder or remove the same or assign this agreement, lease and license without the consent in writing of the Lessor.

15. The title in said welders shall in no case vest in the Lessee.

16. The Lessor agrees that it will at its own expense defend any suits that may be instituted by any third parties against the Lessee for alleged infringement of patents by reason of the use by the

Lessee of the said welders, provided that the Lessee shall have paid all royalties and moneys due to the Lessor and shall give the Lessor immediate notice in writing of the institution of such suits and shall permit the Lessor to defend the same, and shall give the Lessor all needful information in his possession and all reasonable assistance and authority to enable the Lessor to carry on the defence of such a suit.

The Lessor shall not be responsible for any compromise made without its written consent, nor shall it be bound to defend any suit when the same shall arise by reason of the use of welders or parts of welders not furnished by the Lessor.

The Lessee hereby acknowledges to be valid all Letters Patent which the Lessor owns or controls and also acknowledges the titles to said patents to be duly and legally vested in the Lessor.

It is further agreed that if at any time hereafter by the final order or decree of a court of last resort of competent jurisdiction, the Lessor shall be divested of its ownership of its Letters Patent hereinbefore referred to, and by the same order or decree such ownership shall be vested in another person than the Lessor, the Lessor will save said Lessee harmless from all damages that such Lessee may suffer by reason of such transfer of ownership by such order or decree of the court: but it is expressly understood that actual damages, and not resultant or exemplary damages, shall thus be made good to the Lessor by the Lessee.

17. In case the Lessee shall fail to comply with and fulfill any or all of the covenants, terms and conditions of this lease and license, then and in such event (except as herein otherwise provided) the Lessor may terminate this lease by giving written notice to the Lessee, which notice shall state specifically the cause for termination and rendering void of its lease and license and shall declare the intention of the Lessor to terminate the same. Such notice may be given by delivering the original or a copy thereof to said Lessee wherever found in the United States or to any agent or person authorized to transact business for the Lessee or by sending the same by registered mail to said Lessee at his last known post-office address.

And thereupon the Lessee shall have fifteen days after service or mailing of such notice as aforesaid, to remedy or remove the cause

or causes stated in said notice for terminating its license; and if within said fifteen days said Lessee does remove or remedy said cause or causes then said notice shall be withdrawn and this agreement continue in full force and effect.

And in case said Lessee does not so remedy or remove said cause or causes named within said period of fifteen days then this lease and license and this agreement shall be and become null and void from and after the expiration of said fifteen days.

18. Upon any termination of this lease and license for breach thereof the right of possession in any welders in the possession or control of the lessee shall immediately revest in and be restored and returned to the Lessor, and in case of the failure of the Lessee to return said welders to the Lessor within ten days after said termination, then the Lessor or its agents may enter the premises of the Lessee and all persons claiming under it and take or remove said welder or welders without being deemed guilty of any trespass or tort, or the Lessor may pursue its appropriate remedies at law or in equity against the Lessee or any persons in whose possession the welder may be found, and the Lessee shall have no right to the repayment by the Lessor of any sums paid under the terms of this agreement.

The revocation and annulling of this license for any cause shall not affect the rights to royalties or damages accruing to the Lessor from the Lessee.

19. It is made a special condition of this lease that the Lessee shall apply no improvement to or add to the operative elements of any welder obtained by it from the Lessor except with the written consent of the Lessor, nor shall the Lessee alter the mode of operation or arrangement of parts of any of said welders without similar consent of the Lessor.

20. The designation "welder" is herein used to refer in each case to a single apparatus for electric welding with all the machines and devices appurtenant thereto and used therewith.

21. All the rights, interests and remedies vesting in the Lessor under this instrument, and also all those which belong to it by right of ownership of any welders now or hereafter employed in or made subject to the terms of this agreement shall be deemed to belong to

and be enforcible by the successors and assigns of the Lessor in their own name or in the name of the Lessor.

In Witness Whereof, the Universal Electric Welding Company has caused its name to be signed and its corporate seal to be affixed by its president hereunto duly authorized and the said has caused these presents to be signed by its hereunto duly authorized, the day and year first above written, this agreement being for convenience executed in two like parts.

UNIVERSAL ELECTRIC WELDING COMPANY,

By President.

Lessor.

Attest: Secretary.

By President.

Lessee.

Attest: Secretary.

Agreement made this 22nd day of November, 1916, by and between Thomson Electric Welding Company, a corporation duly organized and existing under the laws of the Commonwealth of Massachusetts (hereinafter called the "Thomson Company") and Electric Welder Company, a corporation also organized and existing under the laws of said Commonwealth:

1. Thomson Company hereby assigns to Electric Welder Company all its contracts and rights relating to spot and point welding processes or spot and point welding machines, including the Harmatta Patent (United States Letters Patent, Number 1,046,066, issued December 3, 1912) and the Rietzel Patent (United States Letters Patent, Number 928,701), and all concessions, grants, and other rights and privileges relating to spot and point welding processes, and all its business relating to said spot and point welding processes or machines and the goodwill and benefit thereof.

2. Thomson Company assigns, sets over, and transfers all its rights under the contract entered into by it under date of February 26, 1909, with the Universal Electric Welding Company, a corporation duly organized under the laws of the State of New York (hereinafter referred to as "Universal Company") and all its rights under supplemental contracts with said Universal Company, dated June 17, 1909, and July 20, 1909.

3. Electric Welder Company agrees to save the Thomson Company harmless from the consequences of any failure by the Thomson Company to perform its obligations to Universal Company under said contracts of February 26, 1909, June 17, 1909, and July 20, 1909; provided, however, that Clause Fifteenth of said agreement of February 26, 1909, by which the parties to said agreement agree never at any time during the term of any Letters Patent issued to either of said parties relating to the art of electric welding or to machines to be used in connection therewith, to contest or question the validity of said patents or the sufficiency of either the specifications or the title of the owner thereof, shall remain in full force and effect as between the original parties to said agreement, as shall also all estoppels which have arisen under or resulted from the above contracts, with reference to either party contesting or questioning the validity of any patents owned or controlled by the other party; and the Electric Welder Company shall not be bound to save the Thomson Company harmless in the event of any failure on the part of the Thomson Company to perform the agreement contained in said Clause Fifteenth, or to be governed by said estoppels.

4. Thomson Company agrees with Electric Welder Company that it will fully perform its agreements contained in said Clause Fifteenth of said agreement between it and Universal Company, dated February 26, 1909.

5. Thomson Company agrees to transfer or cause to be transferred to Electric Welder Company all of the property and rights acquired by it from Toledo Electric Welder Company, a corporation organized under the laws of the State of Ohio.

6. Thomson Company hereby appoints Electric Welder Company its true and lawful attorney with power of substitution, in its own name or in the name of said Thomson Company, but at its own expense and for its own benefit, to bring such actions in law or in equity, and to do such other things as seem to it necessary or desirable or proper to secure to it the full advantage of the claims, rights, and property hereby conveyed, transferred or assigned by Electric Welder Company or intended so to be.

7. Thomson Company covenants and agrees to execute such further instruments and to do such other acts and things upon the request and at the expense of Electric Welder Company as said

Electric Welder Company may consider desirable to secure to it the full benefit and advantage of the claims, rights and property hereby conveyed, transferred or assigned to Electric Welder Company or intended so to be.

8. Electric Welder Company agrees to issue as fully paid to Thomson Company its common stock of the par value of $500,000 or all of its common capital stock.

9. It is agreed that all of the covenants herein contained shall bind the parties and their respective successors and assigns; and shall be for the benefit of the respective parties, their successors and assigns to their own use forever.

In Witness Whereof, the parties hereto have caused their corporate seals to be hereto affixed and this instrument to be executed in their names and on their behalf by their officers thereunto duly authorized this 22nd day of November, 1916.

THOMSON ELECTRIC WELDING COMPANY,
[T. E. W. Co. Seal] By J. W. Farley, President.

ELECTRIC WELDER COMPANY,
[E. W. Co. Seal] By Geo. A. Cutter, Treasurer.

Agreement made this 22d day of November, 1916, by and between Universal Electric Welding Company, a corporation duly organized and existing under the laws of the State of New York (hereinafter called the "Universal Company") and Electric Welder Company, a corporation duly organized and existing under the laws of the Commonwealth of Massachusetts.

1. Universal Company hereby assigns, sets over and transfers to Electric Welder Company all its rights under the contract entered into by it under date of February 26, 1909, with Thomson Electric Welding Company, a corporation duly organized under the laws of the Commonwealth of Massachusetts (hereinafter referred to as "Thomson Company") and under supplementary contracts with said Thomson Company dated June 17, 1909, and July 20, 1909.

2. Electric Welder Company agrees to save the Universal Company harmless from the consequences of any failure on the part of the Universal Company to perform its obligations to Thomson Company under said contracts of February 26, 1909, June 17,

1909, and July 20, 1909; provided, however, that Clause Fifteenth of said agreement of February 26, 1909, by which the parties to said agreement agree never at any time during the term of any Letters Patent issued to either of said parties relating to the art of electric welding or to machines to be used in connection therewith to contest or question the validity of said patents or the sufficiency of either the specifications or the title of the owner thereof, shall remain in full force and effect as between the original parties to said agreement, as shall also all estoppels which have arisen under or resulted from the above contracts, with reference to either party contesting or questioning the validity of any patents owned or controlled by the other party; and the Electric Welder Company shall not be bound to save the Universal Company harmless in the event of any failure on the part of the Universal Company to perform the agreement contained in said Clause Fifteenth, or to be governed by said estoppels.

3. Universal Company agrees with Electric Welder Company that it will fully perform its agreements contained in said Clause Fifteenth of the agreement between it and Thomson Electric Welding Company, dated February 26, 1909.

4. Universal Company hereby assigns to Electric Welder Company all outstanding sub-contracts, sub-licenses and sub-leases made by it under said agreements of February 26, 1909, June 17, 1909 and July 20, 1909, with the Thomson Company together with the right to collect all sums accruing after January 1, 1917, upon such sub-contracts, sub-licenses and sub-leases.

Electric Welder Company assumes the obligations of the Universal Company under the sub-contracts, sub licenses and sub-leases hereby assigned.

5. Universal Company hereby assigns to Electric Welder Company all its rights and contracts relating to the point or spot welding process or to point or spot welding machines, including, without in any way limiting the generality of the foregoing, all its rights under Letters Patent of the United States and licenses thereunder and all concessions, grants, and other rights and privileges relating to point and spot welding processes, and all its business relating to said point and spot welding processes and machines and the goodwill and benefit thereof.

It is not intended that any of the patents owned and controlled by the Universal Company which relate to products made by the use of spot or point welding or the income derived therefrom shall be included in this assignment.

6. Universal Company hereby appoints Electric Welder Company its true and lawful attorney with power of substitution in its own name or in the name of said Universal Company, but at its own expense and for its own benefit to bring such actions in law or in equity and to do such other things as seem to it necessary or desirable or proper to secure to it the full advantage of the claims, rights and property hereby conveyed, transferred or assigned to Electric Welder Company or intended so to be.

7. Universal Company covenants and agrees to execute such further instruments and to do such other acts and things upon the request and at the expense of Electric Welder Company, its successors and assigns as said Electric Welder Company, its successors and assigns may consider desirable to secure to it, its successors and assigns the full benefit and advantage of the claims, rights and property hereby conveyed, transferred or assigned to Electric Welder Company or intended so to be.

8. Electric Welder Company agrees to cause to be delivered to Universal Company, its preferred stock of the par value of $350,000, said stock to have preferences and privileges as follows:

> Out of the surplus or profits arising from the business of the Company the holders of the preferred stock are entitled to receive dividends at the rate of seven (7) per cent per annum and no more payable quarterly on the first days of January, April, July and October in each year before any dividends shall be declared, set aside or paid upon the common stock, and such dividends on the preferred stock shall be cumulative, the first being payable April 1, 1917.
>
> Until all the preferred stock shall have been retired, the Company shall set aside for the purchase or redemption of its preferred stock on the thirty-first day of December, in the year 1917, and in each year thereafter, one-third (1/3) of the net earnings of the company after the payment of dividends on its preferred and before the payment of any dividends on the common stock for the fiscal year then last ended. The amount

so determined shall be set aside on the thirty-first day of December in each such year from and only from the surplus profits remaining after full cumulative dividends as aforesaid on the preferred stock shall have been declared and paid or provided for.

Out of any surplus or profits remaining after full cumulative dividends as aforesaid upon the preferred stock shall have been declared and paid or provided for and after the Company shall have complied with the above provisions requiring the setting aside of one-third (1/3) of its net earnings and income for the purchase or redemption of its preferred stock, then and not otherwise dividends may be declared upon the common stock. Upon at least thirty (30) days' notice given by mail to record holders of preferred stock the Company may redeem the whole or any part of the preferred stock at any time or from time to time at the par value thereof ($100.00 per share) plus dividends accrued or in arrears by lot or *pro rata* as shall be provided from time to time by resolution of the Board of Directors. The preferred stock shall be preferred as to both earnings and assets and in the event of any liquidation or dissolution or winding up of the Company the holders of the preferred stock shall be entitled before any distribution shall be made to the holders of the common stock to be paid in full the par value of their shares, together with all dividends accrued or in arrears; and the holders of the common stock shall be entitled to the exclusion of the holders of the preferred stock to share ratably in all the assets of the Company then remaining. The Company shall not without the affirmative vote or written consent of the holders of at least sixty (60) per cent in amount of this preferred stock outstanding create any shares of stock or issue any bonds having priority over or on a parity with this authorized preferred stock.

Upon any increase of the capital stock of the Company no rights shall accrue to the holders of any class of the stock of the Company to subscribe to any part of such increase, but the terms and manner of the disposition of such stock upon its issue may be as determined by the Directors in accordance

with the authority of the vote of a majority of holders of the common stock outstanding.

9. Electric Welder Company further agrees that it will either declare and pay the dividends on said preferred stock, if, as and when earned, in accordance with the preferences above set forth, or it will distribute *pro rata* among the holders of said preferred stock the proceeds of all contracts assigned by the Universal Company, as provided in clause 4 hereof; the proceeds of such contracts to the extent paid by the Electric Welder Company to the said holders of said preferred stock to be reckoned *pro rata* against any dividends on said preferred stock thereafter payable. If any disagreement shall arise between the Universal Company and the Electric Welder Company as to whether or not said preferred dividends have been earned, this question shall be determined by any certified public accountant appointed by the Universal Company, and the decision of such accountant shall, in the absence of fraud, be conclusive upon the Electric Welder Company.

10. It is understood and agreed that all the covenants herein contained shall bind the parties and their respective successors and assigns and shall be for the benefit of the respective parties, their successors and assigns and to their own use forever.

In Witness Whereof, the parties hereto have caused their corporate seals to be hereto affixed and this instrument to be executed in their names and on their behalf by their officers thereunto duly authorized the day and year first above written.

UNIVERSAL ELECTRIC WELDING COMPANY,
By Chas. H. Hyde,
[U. E. W. Co. Seal.] Vice Prest. & Treas.

ELECTRIC WELDER COMPANY,
[E. W. Co. Seal.] By J. W. Farley, President.

PLAINTIFF'S EXHIBIT No. 12, PLAINTIFF'S TRANSLATION OF GERMAN PATENT TO BENARDOS No. 50,909, H. M. H., N. P.

GERMAN PATENT No. 50,909, NIKOLAS VON BENARDOS

Patented from May 8, 1889 Issued February 19, 1890

PROCESS OF OPERATING UPON METALS BY HEATING THEM LOCALLY BY ELECTRICITY

This invention relates to a new application of the heretofore known Joule's law of electricity. The metals to be operated upon, preferably pieces of small dimensions, are brought into contact with a fire resisting, comparatively poor conductor of electricity (graphite, prepared carbon, mixtures of alumina with carbon, magnesium, iridium, carbon with thin metal coatings) while this conductor is traversed by an electric current of such strength that it acquires that temperature which is exactly required for the desired operation upon the metals.

The process may serve to directly weld together relatively thin metal sheets and rods, of like or of different metals; to effect the joining of metals with the use of solder; to bring metal objects or parts to a definite temperature for the purpose of hardening and to anneal hardened objects by heating them to a certain temperature.

This process is clearly distinguished, both from the point of view of the inventive idea on which it is based and from that of its mode of operation, from the prior Benardos process of working metals by the direct employment of the electric arc, as well as from the electric welding process of Elihu Thomson.

In putting into practice the inventive idea defined above, a variety of simple apparatus may be used, from the description of which the characteristics of the invention will be more particularly understood.

To weld together two thin sheets, they are conductively connected by a flexible cable with one of the poles of a powerful source of electricity of low internal resistance. With the other pole of this source of electricity is conductively connected a soldering iron K (see Fig. 1); this soldering iron is made principally of a metal (copper) which is a very good conductor of electricity, and carries in a suitable socket at its lower end, a small piece *w* of fire resist-

ing, poorly conducting material; it is with this piece that the operation on the work is performed.

At its other end the body of the soldering iron is provided with a handle which protects the hand of the workman from the effects of the heat and electricity.

The poor conductor *w* being brought into contact with the metal pieces A', A'' to be operated upon, the circuit is closed and a considerable portion of the electrical energy from the source of current is converted into heat in the poor conductor *w*, which soon begins to glow. By cutting resistance out of the circuit with the aid of a rheostat C, Fig. 1, the temperature of the piece *w* is raised until the metal to be operated upon begins to melt. Then, while moderate pressure is applied, either the electric soldering iron is moved along the seam to be produced or else the metal piece to be operated upon is moved along under the stationary soldering iron. When the operation has been completed, the current is interrupted by a switch and then the soldering iron is removed from the metal.

To provide a stable support for the pieces of metal to be operated upon, they are either laid upon a fireproof support which is a poor conductor of heat (asbestos), or else such a poor heat conductor is pressed against the work on the other side by a suitable device. In certain instances, however, it may be preferable, to produce resistance against the pressure of the soldering iron by placing the pieces to be operated upon upon a support (metal) which conducts the heat away rapidly.

For certain operations to which the present invention is applicable, it may be preferable to employ two opposed soldering irons, one of which is connected to the positive pole, and the other to the negative pole of a source of electricity, the two soldering irons being insulated from each other.

Fig. 2 shows, in plan, elevation and end view, an apparatus designed to carry out the process in the manner just described. Two soldering irons K', K'', are united in a sort of shears or pincers, both being pivotally mounted at C. The passage of the current from one soldering iron to the other through the pivot C is prevented by insulating interposed layers. Binding screws D', D'', receive the ends of the flexible cables connected to the poles of the source of electricity. The current thus flows from D' through

K^{I} to w^{I}, from this piece w^{I} of poorly conducting, fire resisting material through the metal to be operated upon to block w^{II}, and returns through K^{II} and D^{II}, passing through a rheostat to the source of electricity. H^{I} and H^{II} are the wooden handles, and E is a spring by which the two pieces w^{I} and w^{II} are pressed together.

Fig. 3 shows an apparatus which is very similar to that shown in Fig. 2. The soldering irons are here mounted on a standard from which they are, however, insulated by non-conducting, interposed layers D^{I} and D^{II} are here again the binding screws to which the current conductors are connected. The upper soldering iron is hinged at 1 and G is a slidable weight by which the upper soldering iron is pressed against the lower one. F', F'' are two guide rollers, or else two rolls which, besides guiding, serve to smooth the soldered seam as well as to feed and guide the work.

Fig. 4 illustrates a simple apparatus designed for welding rod-shaped objects end to end. Two standards A^{I}, A^{II}, which are connected by binding screws D^{I}, D^{II}, with the poles of the source of electricity, carry at their tops two hinged covers B^{I}, B^{II}, containing pieces W^{I}, W^{II} of poorly conducting, heat resisting material between which the current flows from one standard to the other. These pieces of poorly conducting material are conductively connected, one with the metal of the one standard and the other with the metal of the other standard, in order to give them proper resistance when of small cross section, they are enclosed in jackets of fire-brick or soapstone in the covers B^{I}, B^{II}. The pieces of poorly conducting material are provided with a groove corresponding to the cross section of the pieces to be operated upon.

When an electric current enters at D^{I}, it flows through A^{I}, the poorly conducting piece W^{I} and the work E^{I} to the block W^{II}, thence through A^{II} and out at D^{II}; the pieces W^{I}, W^{II} are thereby caused to glow and cause the heating of the metal piece to be operated upon.

Fig. 5 shows a similar device designed for butt welding wires. The wires to be joined are placed between the jaws W^{I}, W^{II} of poorly conducting, fire resisting material of suitable shape, through which the current flows as in the devices described before. This apparatus comprises a spring E by which the upper jaw is pressed against the lower. To reduce the loss of current heat by radiation,

the main part of the apparatus is enclosed by a jacket M, the fire resisting, insulating and poor heat conducting material, the jacket having suitable openings for the work to pass through.

Fig. 6 illustrates a device which is distinguished from those hereinbefore described in that the current does not pass through the metal itself to be operated upon. The electric soldering iron is, moreover, so constructed that the electric current flows through a piece of poorly conducting material in a similar way as through the filament of an incandescent lamp and this brings the poorly conducting material to incandescence. In Fig. 6, two soldering irons K' and K'' are connected in parallel and combined in one soldering pincer. Between the two poorly conducting pieces W' W'', heated by the current to incandescence, the metal pieces to be operated upon are guided by hand or by two guide rollers F', F''. This modification has the advantage that the pincers can be opened and the metal to be operated upon removed from the soldering device even when the circuit has not previously been opened, without the formation of an electric arm or spark between the metal and the soldering device.

Claims

1. Method of operating upon metals by local heating, the heat being generated by raising to incandescence, by the passage of an electric current, bodies of poorly conducting material (graphite, carbon mixtures of fire resisting, non-conducting and conducting substances), and bringing them into contact with the work to be operated upon.

2. To practice the method defined in claim 1; *a*) The devices represented in Figs. 1, 2, 3, 4 and 5, which can serve for welding and soldering like or different kinds of metal, or for hardening or annealing objects, and which are characterized by the fact that an electric current raises to incandescent fire resisting, poorly conducting bodies to be operated upon. *b*) The inventive apparatus represented in Fig. 8, which is based on the arrangement whereby the work to be operated upon is brought into contact with one or more fire resisting, poorly conducting bodies, raised to incandescence by an electric current, which, however, does not flow through the work to be operated upon itself.

CHART SHOWING COMPARISON OF HARMATTA'S PATENT NO. 1046066 WITH THE PREVIOUS ART

District Court of the United States
Eastern District of Michigan
Southern Division

Thomson Electric Welder Co
vs
Ford Motor Co

Plaintiffs Exhibit No 13

H. W. H.
Notary Public

PATENTS OF THE PREVIOUS ART

			NEW RESULT	STEPS IN HARMATTA PROCESS				CHARACTERISTICS OF HARMATTA PROCESS										
			A WELD PERFECTLY ANSWERING THE PURPOSE OF A RIVET	1 OVERLAPPING THE SHEETS	2 CONCENTRATING WELDING CURRENT AND PRESSURE AT ANY SPOT	3 HEATING IN LINE OF CURRENT AND PRESSURE	4 WELDING WITHOUT MODIFICATION OR MUTILATION	1 HEATED BY OWN RESISTANCE	2 CURRENT FOR WELDING CONCENTRATED BY ELECTRODES	3 PRESSURE FOR WELDING CONCENTRATED BY ELECTRODES	4 SOFTENED METAL SURROUNDED BY COLD METAL	5 WELD MADE QUICKLY	6 NO MODIFICATION OF WORK INVOLVED IN WELDING	7 PARTS WELDED REMAIN STATIONARY	8 ELECTRODES REMAIN COLD DURING PROCESS	9 SIZE OF WELD LIMITED BY ELECTRODES AND CURRENT	10 ONE WELD CAN BE MADE AT A TIME	11 NO PREPARATORY MODIFICATION REQUIRED	12 WELD SURROUNDED AND CANNOT BE SEEN
NOT ELECTRIC WELDING	REC. WELDING	BENARDOS 363320		▨										▨					▨	
	NOT FOR WELDING	COFFIN 437571		▨															▨	
		BENARDOS (GER) 50909		▨															▨	
	FUSION	THOMSON 496019		▨		▨														
	HEATING ONLY	BLANCHARD 466266				▨		▨								▨			▨	
		LEMP 531197				▨		▨								▨				
		BURTON 647694		▨		▨		▨								▨				
	WELDING	THOMSON 396015		▨										▨		▨				
ELECTRIC WELDING	BUTT WELDING	THOMSON 347140				▨		▨								▨			▨	
		THOMSON 347141				▨		▨								▨			▨	
		ROBINSON 574942		▨		▨		▨								▨				
		KLEINSCHMIDT 616436		▨		▨		▨								▨				
	SEAM WELDING	THOMSON 444928		▨		▨		▨								▨			▨	
		LEMP 553923		▨		▨		▨								▨			▨	
	CROSS WIRE WELDING	PERRY 670808		▨		▨		▨						▨		▨			▨	
	BUTT WELDING	PARKINSON (BR. '94) 14536		▨		▨		▨								▨				
		HARMATTA APPLICATION	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		HARMATTA	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

PLAINTIFF'S EXHIBIT No. 15, COPY OF SILESIA-THOMSON CONTRACT, G. C. B., N. P. and Sp. Ex.

This agreement made and entered into this 3rd day of April, 1912, between Eisenhutte Silesia Aktien-Gesellschaft of Berlin, Germany, a corporation duly organized and existing under the laws of Germany (hereinafter called the Silesia Co.), party of the first part and Thomson Electric Welding Company, a corporation duly organized and existing under the laws of the State of Massachusetts, U. S. A. and having an office in the City of Lynn, Massachusetts (hereinafter called the Welding Co.), party of the second part:

Witnesseth that,

Whereas, the Silesia Co. owns or controls an invention relating to certain improvements in Electric Welding alleged to be made by one Johann Harmatta of Szepesvaralja, Hungary and for which invention said Johann Harmatta did apply for letters patent of the United States, the application being filed in the United States Patent Office on or about the 3rd. day of December 1903 and bears S. N. 183,677; and

Whereas, the Silesia Co. did, by a certain instrument in writing dated the 3rd. day of December 1904, enter into an agreement with the National Enamelling & Stamping Company, a corporation of New Jersey, granting unto it certain rights connected with a certain electric welding process or processes useful in the manufacture of enamelled and tinned ware and metal goods in and for the United States; and

Whereas, the Welding Co., is desirous of acquiring the said invention, together with the application for patent and the letters patent to be granted therefor, of the said Johann Harmatta in and for the United States and is also desirous of acquiring all the rights and duties of the Silesia Co. under its said agreement with the National Enamelling and Stamping Company;

Now Therefore, to all whom it May Concern

Be it known that for and in consideration of the sum of Five (5) Dollars by each of the said parties hereto to the other in hand paid, the receipt of which is hereby acknowledged, and of the mutual

covenants and agreements hereinafter expressed, the parties hereto have agreed as follows:

First: The Silesia Co. agrees to deliver to the Welding Co. an assignment in the form submitted duly executed by the said Johann Harmatta transferring the said invention, application for patent and letters patent to be issued thereon in and for the United States to said Welding Co.

Second; The Silesia Co. further agrees to deliver to the Welding Co. an assignment in the form submitted duly executed by it and conveying to the Welding Co. all the rights it may have to the said invention of said Harmatta for the United States.

Third: The Silesia Co. further agrees to deliver to the Welding Co. an assignment in the form submitted duly executed by it and conveying to the Welding Co. all its rights and duties under the said agreement with the National Enamelling & Stamping Company.

Fourth: The Welding Co. agrees to pay to the Silesia Co. immediately upon the delivery to it of the executed assignments referred to in the first, second and third clauses of this agreement the sum of Seven Thousand Five Hundred (7,500) Dollars in Cash.

Fifth: The Welding Co. further agrees to pay to the Silesia Co. a further sum of Twenty Thousand (20,000) dollars immediately upon the issue of a United States patent to the Welding Co. for the said invention and application for patent of said Johann Harmatta provided said patent is granted with the present claim 1 of the Harmatta application or a claim of equal scope therewith. For identification said claim is as follows:

"The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes, pressing said electrodes firmly together and closing the circuit, whereby the specified small round, very sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth."

Sixth: The Welding Co. covenants and agrees to vigorously prosecute said application for patent at its own cost and expense and to use its utmost endeavours and those of its legal advisors and attorneys to secure the grant of said patent with a claim of the scope defined in the fifth clause hereof.

Seventh: The Silesia Co. covenants and agrees to in every manner assist the Welding Co. and its attorneys in the endeavor to secure said patent with such scope and in this connection covenants and agrees to assist in securing said Harmatta's signature to all affidavits, oaths or other papers which may be required to this end, but at the expense of the Welding Co.

Eighth: It is mutually covenanted and agreed that if the grant of a patent for said invention with a claim the equivalent in scope to that defined shall be finally and definitely refused by the Patent Office, the Welding Co. will still have title to whatever patent of inferior scope, if any, may be granted without making the further payment of Twenty Thousand (20,000) Dollars specified in the fifth clause hereof, the object of this clause being to prevent the necessity of paying the further sum specified for a patent of inadequate and practically valueless scope.

Ninth: Notwithstanding any of the provisions hereinabove contained the Welding Co. hereby covenants and agrees that the Silesia Co. and its licensees shall have the unrestricted right and privilege without any compensation to the Welding Co. to import into the United States all and any articles and merchandise manufactured under and in conformity with the invention hereinabove described or any Patent or Patents granted or to be granted thereon and the Welding Co. hereby gives and grants unto the Silesia Co. and its licensees an irrevocable and permanent license to so import into the United States all and any of such articles and merchandise manufactured as hereinabove stated.

Tenth: The Welding Co. covenants and agrees that both itself, its successors and assigns or licensees will under its patents not cause any impediments in any way whatever to the import of welded goods into the United States of America so that neither the Welding Co. nor its successors and assigns or licensees being once in possession of the patents for electric welding will have no right whatever to prevent, impede or disturb the import of goods having been welded in this way into the United States of America.

Eleventh: The Welding Co. covenants and agrees to inform the Silesia Co. continually and promptly as to the progress of the patent negotiations and to let the Silesia Co. know at once if the pat-

ent has been granted with a claim equivalent in scope to that defined or only a patent of inferior scope.

Twelfth: The Welding Co. covenants and agrees to protect the Silesia Co. against any claims which the National Enamelling & Stamping Company may have under her agreement that has been assigned to the Welding Co.

Thirteenth: The Welding Co. undertakes to make all and any transfers or assignments of their rights under this agreement subject to the rights and licenses granted by this agreement to the Silesia Co.

In Witness Whereof, the parties hereto have executed this agreement the day and year first above written.

EISENHUTTE SILESIA, AKTIEN-GESELLSCHAFT.
By Winkler.

THOMSON ELECTRIC WELDING COMPANY.
By Chas. F. Tischner Jr., Attorney.

PLAINTIFF'S EXHIBIT 16. SILESIA AGREEMENT WITH NATIONAL ENAMELING & STAMPING CO. OF DEC. 3, 1904.

This Agreement made this 3rd day of December 1904, between Eisenhutte Silesia Aktien-Gesselschaft of Berlin, Germany organized under the laws of Germany, party of the first part, hereinafter designated Silesia Company — and the National Enameling & Stamping Company, organized under the laws of the State of New Jersey and carrying on business at No. 81/83 Fulton Street, in the City, County and State of New York, party of the second part, hereinafter designated the Nesco Company,

Witnesseth as follows:

I. Whereas the Silesia Company possesses a certain electric welding process or processes useful in the manufacture of enamelled and tinned ware and metal goods.

Whereas application has been made for or on behalf of the said Silesia Company for Letters-patent of the United States, covering certain portions or details of said electric welding process or processes and

Whereas the said Nesco Company desires to obtain for themselves the advantages of the said process for use in their factories.

Now Therefore, it is covenanted and agreed by and between the said parties as follows:

II. The said Silesia Company hereby sells and the said Nesco Company hereby purchases the exclusive right for the United States of America to weld all kinds of handles, lugs, ears, eyes, hooks, sockets, spouts and lips to their ware by the electric welding process of the Silesia Company,— upon the following terms and conditions:

III. The Nesco Company shall pay to the Silesia Company during the next fifteen years Three Cents per gross pieces of ware manufactured by the Nesco Company, by and after the electric welding process.

For this purpose, the Nesco Company shall every quarter of a year, inform the Silesia Company by registered letter, how many pieces of ware have been made in all their factories by and after the electric welding process. The Director of the Silesia Company

shall have the right to examine the correctness of the number of pieces given in the Books of the Nesco Company. The amount of money resulting from the number of pieces of ware, ascertained in this way, shall be paid every quarter of a year to Messrs. Hallgarten & Company, Bankers of No. 5 Nassau Street, Borough of Manhattan, City of New York for and on account of the Silesia Company.

IV. The process of electric welding forming the subject matter of this agreement is intended as a substitute for riveting or fastening in any other manner handles, lugs, ears, eyes, hooks, sockets, spouts and lips to iron and metal ware, and if such conjoining shall be done by electric welding, it is understood and agreed that this contract shall include the same and apply thereto.

V. In consideration of the payment mentioned under Par. III. of this agreement of three cents per gross pieces of ware by the said Nesco Company, the said Silesia Company further covenants and agrees to furnish and give to the said Nesco Company the benefit of the experience acquired by the said Silesia Company in connection with the use of the said electric process for fixing handles etc. on iron and metal ware.

VI. It is further agreed by and between the parties hereto that the Nesco Company shall pay Ten Thousand Dollars to the said Silesia Company as earnest money. This sum of Ten Thousand Dollars, to be paid at once and in advance shall be accounted for against the payments of three cents per gross pieces of ware, as laid down in Par. III. of this agreement.

The Silesia Company shall instruct the representatives of the Nesco Company in the operation of fastening handles by the electric welding process, until such time, as said Silesia Company shall conclude that the said process has been fully demonstrated and the said representatives fully instructed.

VII. The parties hereto further agree, at any time during the next fifteen years, to mutually exchange experience and information gained and acquired during the practical use by them and either of them, of the said electric welding process, applied to the operation of fastening handles on said iron and metal ware,— and while the said Nesco Company and the said Silesia Company or either of them, are using the electric welding process and that for this purpose either of the said Companies shall have the right through its

authorized representative or representatives to enter any of the factories of the other Company and to inspect and study the respective departments in which the process of electric welding is employed.

It is understood and agreed that the said Silesia Company shall communicate or sell their experience to nobody else in the United States, but to the said Nesco Company and that the Nesco Company shall communicate or sell their experience to nobody else in Europe, but to the said Silesia Company.

It is also agreed by and between the parties hereto that the Silesia Company will not at any time during the said term exercise or use or authorize others to exercise or use the said invention within the United States of America, without the consent in writing of the Nesco Company first having been obtained. Moreover, it is agreed that the said Nesco Company shall not grant sub-licenses without the written consent of the Silesia Company and in case such consent is obtained, the said Silesia Company and the Nesco Company shall participate in equal shares in all sums realized from the grant of such sub-licenses.

VIII. It is further agreed by and between the parties hereto that in the event of the granting of Letters-patent of the United States applied for, as herein recited, full and complete license and right to make and use the invention or improvement thereby allowed for the operation of fastening handles on iron and metal ware — in the factories of the said Nesco Company, shall be granted by the Silesia Company to the said Nesco Company.

And it is further understood and agreed that in case any infringement of the said patent should be committed by any person or persons within the United States of America or in case the Nesco Company should be made responsible for using the said invention in the United States of America, the said Nesco Company shall notify at once the Silesia Company, who have to determine at once whether or not the Nesco Company shall commence proceedings for such infringement or defend any action instituted against them. If the Silesia Company so determines, they have to pay the costs of such proceedings, unless otherwise agreed upon ; it is, however, expressly understood and agreed that in the event of the granting of Letters-patent of the United Stated applied for as herein recited, the Nesco

Company shall be entitled to stop payment of the Royalty, herebefore agreed, in case the Silesia Company allows such patent to lapse or to be declared null and void.

IX. Should either of the parties hereto obtain or acquire further or additional Letters-patent for improvements or inventions relating to the said operation of fastening handles by the electric welding process, the other Company shall have the right to use and employ such additional improvements or inventions as follows:

In the event of the Silesia Company securing such new and additional patents, the said Nesco Company shall have full and complete license and right to make and use the same in the United States; and in the event of the said Nesco Company securing such new or additional patents, the said Silesia Company shall have the full and complete license and right to make and use the inventions or improvements in Europe.

X. The said Silesia Company not having perfected yet the electric welding process, by means of which sheets of iron, steel or metal of great thinness are welded together, as a substitute for seaming, joining or in any other manner putting together two or more parts of ware, agrees not to sell the right of using this electric process to any other firm, person or persons in the United States before having offered it on reasonable terms to the said Nesco Company.

XI. It is understood and agreed that the said Silesia Company shall deliver without payment to the Nesco Company two electric welding machines for fastening handles, not including motors.

In witness whereof the parties hereto have executed this agreement in duplicate the day and year first above mentioned.

EISENHUTTE SILESIA AKTIEN-GESSELLSCHAFT.

Witnesseth By

PLAINTIFF'S EXHIBIT No. 28.

In the United States District Court, District of Massachusetts.

In Equity

Thomson Electric Welding Company, et al.

vs.

Barney & Berry, Incorporated.

On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,

County of Trumbull.

Fred P. McBerty being duly sworn, deposes and says as follows:

My name is Fred P. McBerty. I am 44 years of age and am Secretary and Treasurer of the National Electric Welder Co., at Warren, Ohio.

After leaving the revenue service of the government on December 7th, 1897, my discharge from the service being attached hereto as Exhibit K, I entered the employ of the Wm. Todd Co., at Youngstown, Ohio, where I remained for a few months and then entered the employ of the Warren Electric and Specialty Co. at Warren, Ohio, in the spring, I think in March, 1898. There I took charge of the power plant and machinery. The business of the company was the manufacture of incandescent lamps. I soon had the machinery of the plant in good condition so that it did not require all of my time and furthermore, the Company was desirous of undertaking the manufacture of some products which could occupy the factory during the summer when there was scarcely any lamp business. It was at the time debated whether the manufacture of electric fans or telephones should be taken up. It was decided then to manufacture electric desk fans and the design was started in the Spring of 1898, that is the same Spring that I entered the employ of that Company. That year, however, (1898), few fans were sold. The next year a considerable business was done in the fans as was also the case in 1900. In 1900 it was thought that a better business could be done if the Company also manufactured a cheaper fan. Up to this time a considerable quantity of brass had

been used in the manufacture of the fans, particularly the fan guard was made of brass rods and wire, and other parts were made of brass, and required considerable labor for buffing and finishing in addition to the cost of the brass itself. It was therefore proposed to make the fan guards, and other parts previously made of brass, of iron and to japan the whole. This was in the summer and fall of 1900 in preparation for the fan season of 1901. One of the difficulties in manufacturing this new cheaper fan was found to be that the fan guard rings could not be secured together satisfactorily with the methods that had been employed in connection with the brass rings of the previous fans. At this time I conferred with Mr. Evrah C. Lipps, who was with the Warren Electric and Specialty Co., and who had had some experience with electric welding previously. I recall also at this time we were considering the electric welding, that Mr. Edward Craft of the Company went to Freehold, N. J. to inspect a transformer which had been supplied by the Warren Electric and Specialty Co., to the Pneumatic Wheel Co. for use in an electric welding machine. This transformer which Mr. Craft inspected was one which had been sent to take the place of a smaller transformer which the Freehold concern had. There was also sent with this transformer, a regulator. In connecting up the apparatus, immediately after its arrival, there was considerable trouble so that Mr. Craft was sent to find out what the matter was. I have before me the transformer data book of the Warren Electric and Specialty Co. kept at that time, which shows that the first transformer (which was replaced) was shipped on June 27th, 1900 and was returned and turned over to the fan motor department on January 20th, 1901, and that the larger and regulating transformers were shipped on Sept. 27th, 1900.

The Warren Electric and Specialty Co. had entered upon the manufacture of transformers about the same time that they took up the manufacture of electric fans. I attach hereto a transformer test book which was kept by Henry W. Wiswell. The first record in this book of a transformer test was made on July 18th, 1899. This book is marked Exhibit L.

I may say here in order that the relations of the companies may

be understood, that the Warren Electric and Specialty Co. sold all of its business in electric fans and transformers to the Peerless Electric Co., retaining the incandescent lamp business which was afterwards sold to the National Electric Lamp Association. The Peerless Co. in turn sold its transformer interests to the Peerless Transformer Co. which in turn was succeeded by the Enterprise Electric Co., all of Warren, Ohio, and the Peerless Electric Co. retained the motor business.

Upon his return from Freehold, N. J., Mr. Craft had ideas about electric welding machines, and as a result of conversations with Mr. Craft and my previous consultation with Mr. Lipps, I decided that electric welding would be the best means of securing the ends of the iron fan guards together. I accordingly in the summer or fall of 1900, made a sketch of a proposed welding machine which original sketch I attach hereto and it is marked Exhibit M. From this sketch which is not drawn to scale and is not a working drawing, a welding machine was made and set up in the old frame building of the Warren Electric & Specialty Co. before the brick buildings for the Peerless Electric Co. were started. These brick buildings were begun in the Spring of 1902 at the time when the Peerless Co. was organized. I attach hereto as Exhibit N, the report made to the stock holders on July 31st, 1903, at the end of the first complete fiscal year of the company. I was a stock holder in this company and received the exhibit referred to in the usual course at about the time of the date which it bears (July 31st, 1903).

The organization of the Peerless Electric Co., its starting business, and the building of the new buildings for it, which took place in 1902, was impressed on me strongly as it marked a great change in the business in which I was engaged. Further I recall that in 1902 when the Peerless buildings were being constructed I was building a house of my own and obtained some of my materials along with those for the Peerless buildings. After my house was finished heating apparatus was put in and I attach hereto, marked Exhibit N′, the bill for heating, supplies which were put in my

house on or about Sept. 20th, 1902, the date of the item in the bill. The bill was rendered on or about Dec. 19th, 1902.

The Exhibit M attached hereto, is in exactly the same condition now (except that it has become somewhat worn) that it was when it was made by me in the summer or fall of the year 1900 and no alteration or change whatever has been made in it.

This exhibit bears the statement "Welder for 1901 cheap guards". This statement is in my handwriting and was placed on the sketch at the time it was made, which was in the summer or fall of 1900, when preparations were being made for the manufacture of the 1901 goods. This exhibit M has been in my possession since last December when I obtained it from Evrah C. Lipps who took it at the time the welder was under way as I have described. The machine made in accordance with this sketch and set up in the old Warren Electric Company's building as I have described, was ready for use early in 1901 and was employed in manufacturing the 1901 goods. This machine remained in the use of the Warren Electric & Specialty Company and their successors the Peerless Electric Co. up to the time I left that concern in 1906. It was in operation by the Peerless Electric Co. at the time I left and I understand continued so for a number of years. A few years ago I am informed it was taken down because the Peerless Co. decided to buy their guards instead of making them, and the welding machine was placed in the stock room. It was there when I bought it in 1911 and has been in my possession at the works of the National Electric Welder Co. ever since. The machine operates now in the same way that it did in 1901 and is practically the same as it was then.

When the machine was ready for use, in the early part of 1901, I operated it at various times to demonstrate its capabilities as a welder. The whole subject of electric welding was a new one to me and I was desirous of finding out whether it would satisfactoriiy perform various operations of welding. I demonstrated to my own satisfaction and also that of others, that the machine would butt weld satisfactorily, that is, it would weld the abutting ends of bars together over the whole area of the ends, and also that sheets or

plates of metal could be welded together in spots less in area than the overlapping portions of the plates. These welded parts could of course be duplicated, and these spots were held together as by rivets spaced apart. The spot welding was entirely satisfactory and thoroughly demonstrated the practicability of this form of welding. In performing the butt welding, the pieces to be welded together were secured in the welding clamps. The welding clamps were then moved towards each other until the ends of the stock abutted. The current was then turned through the abutting ends and maintained until a welding heat was secured at the joint. Pressure was then applied at the joint by forcing the clamps towards each other, the current being almost simultaneously cut off. This completed the weld. To make the welds in spots, copper bars were secured in the clamps of the machine to form electrodes. These electrodes had opposing points of about 1/8″ in diameter. The overlapped sheets to be welded together were then placed between the electrodes, the clamps were then moved toward each other until the electrodes touched the sheets or plates on opposite sides with a slight pressure. This localized the pressure at the spots where the electrodes were located and also localized the current or heat in the spot to be welded. The current was then turned on until the welding heat was secured and then the electrodes were forced together and the current cut off. The weld was then completed. It will be seen from this description that the butt and spot welding differed simply in restricting the size of the weld. The butt weld was a weld over the whole faces of the pieces welded together, while the spot weld was simply a lessening of this area when this was sufficient to hold the piece together so that the only difference between butt welding and spot welding is that in one case the whole contacting areas are welded together, while in the spot welding only a part of the areas are welded. The spot welding was simply a natural variation of the butt welding when the work was of such a nature as to require it. It never occurred to me or to anybody with whom I had anything to do, that there was any invention in making a weld as large or as small as you wanted to use, that is making a butt or spot weld. I have taken out many patents and if I thought

any invention could be involved in this spot weld I would have applied for it. I and my associates were very much surprised on noting that the Harmatta Patent for spot welding had been granted as it had not occurred to me or my associates that a patent could be secured on such a thing.

As I have before stated the Warren Company was in the latter part of 1900 and 1901, preparing to put out a cheap iron fan, and, as I have also stated, the welding machine which I devised and built (Mr. Craft superintended the actual building) was employed for butt welding the ends of the fan guard rings together. It occurred to me that the welding machine could also be used to cheapen these fans by employing it to secure the fan blades to the center arm by a number of spots which would take the place of the rivets which were previously employed. This was the only fan construction, or in fact any construction, which was employed by the company to which this character of weld was adaptable. In demonstrating the practicability of this idea I took one of the steel fan blades and centers and welded the blades to the center arm, each blade being secured to the arm by a number of welds in different spots. This was done by me in the spring of 1901, this being the time the machine was finished and its capability of butt welding the ends of the fan guard rings demonstrated.

I produce, attached hereto, as Exhibit O, a fan blade welded to an arm in a plurality of distinct spots which was welded by me in the spring of 1901 as I have described, and has been retained by me from that time to this. It has not been changed or altered in any particular. In this exhibit, the piece to which the fan blade is welded is the arm of the central spider of the fan, and originally this arm with three others, making four in all, were fastened to the hub. This particular fan blade which I have produced has been in my tool chest since the spring of 1901 as I have stated. The fan consisting of the four blades and centers was too large to put in my tool chest and so I cut off the arm with the blade as hereto attached to preserve as an illustration of how I had employed the welding. I often preserve in this way the first specimens of work which I have done as being interesting on that account.

The question of adopting the spot welding in place of the riveting on the cheaper fans was seriously considered and would have been adopted except that the fan blades and centers, which we already had in stock, had been punched for the rivets and it made a somewhat botched job to leave the rivet holes open and secure the blades to the spiders by spot welding. Furthermore, inasmuch as the punching had already been done there was no saving in spot welding over the riveting. Furthermore, the tools and jigs to perform the spot welding rapidly would have required a further expenditure. Moreover, this was in the month of Febrnary, which was well along in the fan season, so that it was impracticable to make a change over for that season so that it could only have been availed of for the next year. Furthermore, the riveted fans proved satisfactory and as they already had the tools and standard stock for building these fans, it was not thought advisable to provide a second set of apparatus and a duplicate set of unpunched stock for the spot welding of the cheaper fans. The result of all this was that it turned the scale in favor of the non-adoption of the spot welding for the fans, Mr. Gillmer, the Secretary and Treasurer of the Warren Company, refusing to consent to this additional outlay, especially in view of the fact that the margin of saving would not have been great in this case. The welder was continued in use by the Warren Company as a butt welder as I have described. The machine remained in use as a butt welder by the Peerless Company after its organization, first at the works of the Warren Electric & Specialty Co., and it was later moved to the works of the Peerless Company when they were constructed in 1902, and was in use there up to three or four years ago. There was no work that we could use spot welding on advantageously, which accounts for the use of the machine for butt welding only in the regular commercial work.

I also attach hereto, marked Exhibit P, a fan center arm welded in a number of distinct spots to a piece of sheet steel. This Exhibit was made by me in the spring of 1901 at the time I was demonstrating the capabilities of the welding machine. This is a piece which happened to be made by me at the time I was first using the machine and I happened to preserve it as a specimen of my first

work in this line. It has been in my possession since the spring of 1901 and has not been changed in any respect.

I recall distinctly that in the spring of 1901 when I was operating the welding machine as I have described, that I sent for Frank G. Brown to see if he would not enter the employ of the Warren Electric & Specialty Co., I recall that he was at that time in the employ of the Packard Automobile Company, then known as the Ohio Automobile Co. and that he declined to come as he said a demand had been made by the machinists for a nine hour day. He said he thought this would be granted and that it was to his advantage to stay where he was. I recall that Brown's visit was on a Sunday when there was no current on, but I explained the welding machine and its operation for both butt and spot welding to him and showed him fan blades spot welded to center arms the same as Exhibit O hereto attached among other things.

I also distinctly recall that in the summer of 1901 when Evrah C. Lipps was in the employ of the Trumbull Co. (when he visited me at the works of the Warren Electric and Specialty Co.) and also when he returned to the employ of the latter Company in the fall of 1901, I explained the welding machine and its operation, for both butt and spot welding to him. He was very much interested in the matter and we both from time to time would weld specimens (both butt and spot welds) and I explained to him that I thought the spot welding could be advantageously used for securing fan blades to centres and showed him specimens the same as Exhibit O hereto attached and the manner in which they were welded.

In order to give a more detailed idea of the welding machine as it existed in the spring of 1901, I attach hereto, two pencil sketches, marked Exhibits R and S respectively. The sketch Exhibit R is a top plan view and the Exhibit S is a longitudinal, vertical section through one of the movable clamping members. Referring to Exhibits R and S, 1 and 2 are two parts electrically insulated from each other but mechanically secured together so as to form the base plate of the machine. Upon the base plate of the machine the two clamps carrying arms, 3 and 4 are pivoted at 5 and 6. The fixed jaws 7 and 8 are secured to the arms 3 and 4 by bolts 9 and 10.

The movable clamp jaws 11 and 12 are slidably secured on the arms 3 and 4 by bolts 13 and 14 which extend through slots 15 and 16 in the clamp jaws 11 and 12. When the nuts are loose on these bolts 13 and 14 the jaws 11 and 12 can move back and forth toward and away from the fixed jaws 7 and 8. To force the movable jaws up so as to clamp the work between them the arms 17 and 18 are provided. These arms are pivoted at 19 and 20 to the arms 3 and 4 and have cams 21 and 22, which bear or press against the clamps 11 and 12, when the arms 17 and 18 are moved towards the left, and force these movable jaws towards the fixed ones to clamp the work. In order to move the clamps towards each other, to produce the welding pressure on the work, arms 23 and 24 are provided which are pivoted to the base plate at 25 and 26. These arms have cam ends 27 and 28 which, when the arms 23 and 24 are moved outwardly in opposite directions, come against the ends 29 and 30 and force them inwardly, thereby carrying the clamps towards each other. In the sketch are shown two pieces 31 and 32 in the clamps. If this is stock to be welded together the clamps are moved towards each other until the ends of the stock meet from one clamp to the other and until the welding heat is reached when they are pressed together, the current cut off, and the weld is completed. The clamps are then loosened to restrict the welding to a spot, that is to perform so-called spot welding, the bars 31 and 32 were made of copper and had their opposing ends made the size of the welded spot desired. These copper bars were secured in the clamps by forcing up the movable jaws and securing them by tightening up the nuts on the bolts 13 and 14, overlapped sheets of metal were then placed between the electrodes 31 and 32 and the clamps moved toward each other until the electrodes pressed upon the overlapping sheets on opposite sides. Current was then passed through the electrodes and overlapping sheets of metal from one clamp to the other, a welding heat was produced and then pressure was applied to force the heated metal of the plates together to form a weld which was about the size of the ends of the electrodes 31 and 32, and the current was cut off. The electrodes were then withdrawn by separating the clamps and the operation repeated in as

many spots as desired. Current is supplied to the clamps having jaws 8 and 12 by conductors 33 and 34 leading to one pole of the transformer while the current is supplied to the other clamp by means of conductors 35 and 36 leading to the other pole of the transformer. The welding machine which I built and operated at the factory of the Warren Electric and Specialty Company, Warren, Ohio, in the early part of 1901 was the same as that as shown in Exhibits R and S and was operated at that time to perform butt and spot welding in the manner as I have just described in connection with these Exhibits.

I distinctly remember that at that time the space between the clamp arms 3 and 4 was not sufficiently deep to permit the sheets to be welded together to extend sufficiently low-down when placed between the electrodes 31 and 32, when these electrodes were straight, and so we bent the ends of these electrodes upwardly so as to allow the sheets of metal to enter between the electrodes to a sufficient extent to place the weld at the spot desired. This machine was used as I have described for some years subsequent to 1901, but in the use of the machine it was found by the operator that after the arms 17 and 18 had been thrown to force the clamp jaws together they would reach their limit of movement in this respect and to all intents and purposes were secured to the arms 3 and 4. It became the practice to move these arms 3 and 4 by these levers 17 and 18 in forcing the clamps together to effect the weld and the arms 23 and 24 fell into dis-use, and being in the way were removed. I do not know just when this occurred but it followed in the natural course of use of the machine some time after it had been built in 1901. In the original machine the base plate was made in two pieces 1 and 2 which were separated by a piece of fibre, to insulate them, which extended substantially the whole length of the base plate. It was found however, that the drip from the welds under the pieces 31 and 32 was caught by the fibre and sometimes established a connection between the metal plates 1 and 2 which would require the cleaning out of this drip to get good operation of the machine. This hot drip would also burn the fibre. The fibre piece was therefore cut out directly under the spot where the weld was

made which afforded a larger clearance for the insertion of sheets to be welded and also prevented the accumulation of the drip. The machine was used in this condition by the Warren Electric and Specialty Company and their successors the Peerless Electric Company for electric welding up to about five years ago when, in order to improve the insulating qualities of the machine the base plates 1 and 2 were placed upon a plate of slate. Also the conductors 35 and 33 were omitted as it was found that the conductors 34 and 36 were ample to carry the necessary current. The machine is now in this condition in my possession at the works of the National Electric Welder Company in Warren, Ohio. These changes made as I have noted were minor details made with a view to simplifying the machine and making insulation more efficient, and did not change the manner of operation or the work produced, the machine being substantially the same and operating in the same way and producing the same work as when it was originally built in 1901.

I have seen various makes of machines used for spot welding and butt welding and in every case the butt welding machines could as well be used for so-called spot welding, it being merely a question of whether a large weld or a small weld is desired, and as to the securing of sheets together by welds in a number of separated spots this merely means that the making of a weld in one spot is duplicated a number of times.

FRED P. MCBERTY.

Subscribed and sworn to before me this 9th day of October, A. D. 1913.

C. E. Stephens,
Notary Public in and for Trumbull County, at Warren, O.

[Notarial Seal]

PLAINTIFF'S EXHIBIT 29.

In the United States District Court. District of Massachusetts.
In Equity.

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull, ss.

John S. Gilder being duly sworn, deposes and says as follows:—

My name is John S. Gilder. I am 38 years of age and reside in Warren, Ohio. I am at present employed by the Enterprise Electric Company at Warren, Ohio, as a transformer assembler.

Early in the year 1900 I came from the home of my parents in Kinsman, Ohio, and entered the employ of the Warren Electric & Specialty Company in Warren, Ohio. This was in the early part of the year 1900, in January or February, because I remember that it was cold and wintry.

When I first entered the employ of the Warren Electric & Specialty Company in 1900, the company was making its fan guards of brass. The rings of these guards at first had their ends secured together by inserting them in a sleeve and then securing them with solder.

Later it was the practice to dowel the ends of the rings together and then sweat them.

The next season, or the one after, that is in the year 1901 or 1902, the manufacture of iron fan guards was begun by the company. At first they tried brazing the ends of the iron rings for the guards together, but that was not satisfactory and the welding of the iron guard rings by electricity was begun.

This electric welding was started either the same season that the use of iron fan guards was begun, that is in 1901 or 1902, or it may have been the next season after that. I have given these dates entirely from recollection and have no papers or memoranda by which I can verify them.

I recall in a general way seeing the electric welding machine

which was used for welding the iron fan guards at the time I have mentioned. I recall this machine in a general way, but could not go into details regarding it. I recall that there were two short handles for pushing the clamp jaws together to secure the work in them, and there were two larger handles for pushing the clamps toward each other to bring the stock together to weld it. My work at the time was that of general utility man. I helped form the pieces for the guards in the shop and sometimes would assist in the welding. The only kind of welding which I remember seeing done on the machine at that time was the welding together of the ends of the stock to make the fan guard rings. It was only occasionally, however, that I was in a position to know what kind of work was being done on the machine so that other kinds of work and characters of welds may have been made which I knew nothing about.

I have, on October 7th, 1913, examined a welding machine at the works of the National Electric Welder Company at Warren, Ohio, and while I did not have sufficient to do with the machine so that all details were impressed on my mind, this appears to be the same machine that I saw used at the factory of the Warren Electric & Specialty Company for welding the rings of iron guards as I have described.

JOHN S. GILDER.

Subscribed and sworn to before me this tenth day of October, A. D. 1913.

C. E. Stephens,
Notary Public.
Trumbull County, Ohio.

[Seal]

PLAINTIFF'S EXHIBIT No. 30.

In the United States District Court. District of Massachusetts.

In Equity

Thomson Electric Welding Company, et al.

vs.

Barney & Berry, Incorporated.

On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Michigan,

County of Wayne, ss.

Evrah C. Lipps, being duly sworn, deposes and says as follows:

My name is Evrah C. Lipps; I am forty five years of age; and reside at 1131 Canton Avenue, Detroit, Michigan. I am employed by the Packard Motor Car Company, at their factory in Detroit, Michigan. Up to about a month ago I was night superintendent, but since that time, owing to the fact that the night shift was taken off, I have been assigned to the installing of a special tool system in the factory until such time as the night force shall be resumed. I have been in the employ of the Packard Company since three years ago last April. Up to the time I entered the employ of the Packard Company about three and a half years ago, I was employed since a boy in the electrical industries, having entered the employ of the old Brush Electric Company, in Cleveland, Ohio, when I was 15 or 16 years old; since that time I have been employed, up to three and a half years ago, in connection with the manufacture of electric lamps, motors, welding apparatus, transformers, and various other electrical apparatus. In addition to the Brush Electric Company, I have been employed by the Buckeye Electric Company, W. G. Avery, of the Avery Stamping Company, and the Warren Electric & Specialty Company.

I entered the employ of the Warren Electric & Specialty Company for the first time in January or February, 1898. This was a month or two before the date of my agreement for employment by the Warren Electric & Specialty Company, which agreement is dated March 2nd, 1898. A copy of the original agreement is attached hereto as Exhibit D. I further fix the date when I went with the Warren Electric & Specialty Co. for the first time by the

attached two telegrams, sent to me by the Warren Electric & Specialty Co. which are respectively dated January 7, 1898, and January 18, 1898, and which have been preserved in my possession since the dates mentioned. These telegrams relate to my entering the employ of that company which I did very shortly after the dates of the telegrams. These telegrams are marked as Exhibits "E" and "F". I left the employ of the Warren Electric & Specialty Company in the summer of 1900, and went to Cleveland, Ohio, where I engaged in the manufacture of electric fans on my account. Attached hereto is the time book (marked Exhibit "G"), which I kept during this work in Cleveland, in which time spent is marked beginning on August 20th, 1900, and continuing until April 29th, 1901, when I discontinued my Cleveland enterprise and went back to Warren, Ohio. I at first went to work for the Trumbull Manufacturing Company, where I remained but a few weeks, and in the early fall of the same year that I went back to Warren, that is, in 1901, I again went into the employ of the Warren Electric & Specialty Company, where I remained until I went into the employ of the Packard Motor Car Company, in Detroit, about three and a half years ago. As fixing the time when I went into the employ of the Warren Electric & Specialty Co. for the second time as in the fall of 1901, my oldest child was born on October 6th, 1901, and I had then re-entered the employ of the Warren Electric & Specialty Co., after I had left the Trumbull Co. This child was born almost exactly two years after my marriage which took place in the fall of 1899 in Warren, Ohio, where I was in the employ of the Warren Electric & Specialty Co. the first time. It was between the date of my marriage, and the birth of my first child that I went in business in Cleveland as before referred to.

During my first employment with the Warren Electric & Specialty Company, that is, from January or February, 1898, to the summer of 1900, I was employed in manufacturing incandescent lamp filaments, and was also connected with the manufacture of electric fans. During this time I was closely associated with Mr. Fred P. McBerty and we frequently talked over the matter of electric welding before I went to Cleveland to engage in business on my own account in 1900. I recall that Mr. McBerty made a sketch of an electric welding machine in connection with these discussions. I

saw Mr. McBerty make the sketch and I took it among other papers with me when I went to Cleveland, in 1900. This sketch has been in my possession ever since that time until I gave it to Mr. McBerty at his request last December. This sketch when I gave it to Mr. McBerty last December was the same as it was in every particular when it was made and when I took it with me to Cleveland in 1900, and had not been changed by any one in any respect whatever. I have not seen it since. I have, however, examined the sketch shown in photograph Exhibit "A" and attached to the affidavit of Mr. Frank G. Brown in this same matter and executed on October 6th, 1913, and the sketch shown in this photograph appears to be identical with the original sketch which I gave to Mr. McBerty last December.

When I was working with the Trumbull Company in 1901, as I have referred to, I frequently went to the works of the Warren Electric & Specialty Company to see Mr. Fred P. McBerty with whom I was very friendly and during these visits I saw an electric welding machine which was arranged as shown in the sketch given to Mr. McBerty last December and in the Exhibit "A" attached to Brown's affidavit above referred to. At the time of my visit to Mr. McBerty in 1901 this machine was used for butt-welding the rings of fan guards and I recall distinctly that on one of my visits I found Mr. McBerty changing the transformer which supplied current to the machine, the reason for this being that the transformer which had been used was not of large enough capacity to supply the current for welding the inner fan rings, so that the transformer became overheated and the change consisted in putting in a transformer of larger capacity so that sufficient current could be supplied. I also recall that at the time of my visits to Mr. McBerty while I was with the Trumbull Company that spot welding, as well as butt-welding was performed on this machine. By butt welding I mean the welding together of two pieces butted together end to end and welded over their whole abutting area. By spot welding I mean the welding together of thin plates or sheets which are overlapped and welded together at one or more spots which are less than the overlapping area. I attach hereto two thin pieces of sheet metal which are spot welded together at a number of spots, the same being marked "Exhibit H". These pieces of sheet metal

welded together were welded on the machine at the Warren Company's factory during one of my visits to Mr. McBerty while I was with the Trumbull Company. The actual operation of welding these pieces together was performed either by himself or Mr. McBerty, I do not remember who did this particular piece of work. I recall that Mr. McBerty and I together were welding various pieces of sheet metal together to observe the efficiency of the weld and I saved this Exhibit "H" as a kind of a sample.

The sheets welded together in this Exhibit were halves of armature lamination discs which were used by the Warren Company in the manufacture of the core for their fan motor armature. This Exhibit "H" has been in my possession ever since it was made in 1901, and is exactly the same now as when it was made, and has not been changed in any way whatever. With the transformer of larger capacity installed, this machine was in actual commercial operation from 1901 up to 1910. I understand that at the present time and since 1910 it has been in the factory of the National Electric Welding Company at Warren, Ohio, where it is used as occasion may require. The principal work for which the welder was used in a commercial way was the butt welding of the fan guard rings. At about the time I went back with the Warren Electric & Specialty Company, leaving the Trumbull Company, in the fall of 1901, I saw steel fan blades welded to the hub arms in a number of distinct spots. I saw the operation of welding the fan blades to the center arms in a number of spots as I have described performed upon the welding machine at the Warren Company, and I saw others that had been previously welded. In fact, at the times of my visits to Mr. McBerty while I was still with the Trumbull Company he had told me that he proposed the use of the spot welding of the fan blades to the centers in producing a commercial cheap grade of fans and said that he had already spot welded fan blades to the centers but as the times of my visits to the Warren Company were limited on account of my employment with the Trumbull Company and as none of these spot welded fan blades happened to be about I did not see this particular thing at that time but first saw the spot welded fan blades in the fall of 1901, about the time I went back to the Warren Company as I have described. The fan blades and center arm spot welded together and attached to the affidavit of Mr.

Brown above referred to as Exhibit "B" is identical with what I saw at the Warren Company in the fall of 1901, if in fact it is not one of those which I saw. I recall distinctly that in the structures which I saw in the fall of 1901, wherein the fan blades were spot welded to the center arms, the blades and arms were drilled for rivets which was the standard way of securing blades used by the company and I note that in the Exhibit "A" attached to Mr. Brown's affidavit these holes are present and the Exhibit is in all other respects the same as the structure I saw in the fall of 1901. I recall distinctly that both during my visits to Mr. McBerty while I was with the Trumbull Company and after I re-entered the employ of the Warren Electric & Specialty Company, in the fall of 1901, I had considered that the securing of sheet metal together by welding in spots as performed on the machine at the Warren Company was strong and reliable and adapted for practical use unless there should be some financial reason against it. So far as I know, however, the spot welding of the fan blades to the centers as proposed by Mr. McBerty was not adopted commercially by the Warren Company for the reason that the spot welding of the blades to the centers left the rivet holes which did not give a satisfactory appearance but looked like an unfinished job and the dies and punches for the fan blades and centers, with holes for the rivets, had already been made so that a new set of dies and so forth would have been necessary to produce a good looking spot welded job and furthermore, this would have necessitated the carrying of a double stock of parts by the company. On this account Mr. E. W. Gillmer, now dead, who was secretary and treasurer and manager of the Warren Company did not think that the spot welding of the fan blades, under the circumstances, would be a good financial proposition, and therefore refused to allow it to be put into the regular commercial output. Since 1901, when this welding was done as I have referred to to the present time I have often heard Mr. McBerty refer to spot welding and butt welding and know that both of us had in mind that either butt or spot welding might be used as would appear most advantageous under the circumstances of a given case. The demonstration of the spot welding in 1901, having clearly satisfied us all that the spot welding as well as the butt welding was practical and successful. In fact, the tests and

trials of the machine were as much to demonstrate the practicability of butt welding with it as to demonstrate spot welding and the proved success of the one followed as a natural consequence the proved success of the other as spot welding differs from butt welding simply in confining the current to a smaller area of the proposed surfaces, when of course, the heated area and the weld are correspondingly limited. I am informed that a patent has been granted upon so called spot welding and am very much surprised that this could be the case as it seems to me that the so-called spot welding is a natural variation from from butt welding according to circumstances which may require a larger or smaller area to be welded. Both Mr. McBerty and I have applied for and secured patents upon inventions and if we had thought that there could be any possible invention in so-called spot welding an application for a patent on it would certainly have been made. It is the commonest engineering expedient to make the welds large or small as reasons of strength or otherwise may make most advantageous. Many years previous to 1901, when I saw the welding on the machine at the Warren Company's factory as I have referred to, I myself, while in the employ of W. G. Avery, used electric arc welding and welded the pieces together at spots or over their entire opposed faces according to the circumstances governing the particular job and never believed that there was anything patentable in enlarging or restricting the welded area.

I attach hereto a sketch marked Exhibit "I" which shows the welding machine which I saw at the works of the Warren Electric & Specialty Company in 1901, as it was at that time. This sketch is substantially the same as the sketch Exhibit "A" attached to Brown's affidavit referred to above, but the photographic sketch was preliminary to the machine and therefore may differ in some slight and unimportant details from the sketch of Exhibit "I". Furthermore, this Exhibit "I" may have reference to numerals marked on it which I do not care to put upon the photograph.

In this Exhibit "I" the top figure is a top plan view, and the bottom figure is a longitudinal vertical section through one of the movable clamping members.

In this sketch Exhibit "I" 1 and 2 are two parts electrically insulated from each other but mechanically secured together so as

to form the base plate of the machine. Upon the base plate of the machine the two clamp carrying arms, 3 and 4 are pivoted at 5 and 6. The fixed jaws 7 and 8 are secured to the arms 3 and 4 by bolts 9 and 10. The movable clamp jaws 11 and 12 are slidably secured on the arms 3 and 4 by bolts 13 and 14 which extend through slots 15 and 16 in the clamp jaws 11 and 12. When the nuts are loose on these bolts 13 and 14 the jaws 11 and 12 can move back and forth toward and away from the fixed jaws 7 and 8. To force the movable jaws up so as to clamp the work between them the arms 17 and 18 are provided. These arms are pivoted at 10 and 20 to the arms 3 and 4, and have cams 21 and 22, which bear or press against the clamps 11 and 12, when the arms 17 and 18 are moved towards the left, and force these movable jaws towards the fixed ones to clamp the work. In order to move the clamps toward each other, to produce the welding pressure upon the work, arms 23 and 24 are provided which are pivoted to the base plate at 25 and 26. These arms have cam ends 27 and 28 which, when the arms 23 and 24 are moved outwardly in opposite directions, come against the ends 29 and 30 and force them inwardly, thereby carrying the clamps towards each other. In the sketch are shown two pieces 31 and 32 in the clamps. If this is stock to be welded together the clamps are moved towards each other until the ends of the stock touch. Current is then passed through the stock from one clamp to the other until the welding heat is reached when they are pressed together and the weld is formed. The clamps are then loosened and the welded stock removed. When it was desired to restrict the welding to a spot that is to perform so-called spot welding, the bars 31 and 32 were made of copper and had their opposite ends made the size of the welded spot desired. These copper bars were secured in the clamps by forcing up the movable jaws and securing them by tightening up the nuts on the bolts 13 and 14. Overlapped sheets of metal were then placed between the electrodes 31 and 32 and the clamps moved toward each other until the electrodes pressed upon the overlapping sheets on opposite sides. Current was then passed through the electrodes and overlapping sheets of metal from one clamp to the other, a welding heat was produced and then pressure was applied to force the heated metal of the plates together to form

a weld which was about the size of the ends of the electrodes 31 and 32. The electrodes were then withdrawn by separating the clamps and the operation repeated in as many spots as desired. Current is supplied to the clamps having jaws 8 and 12 by conductors 33 and 34 leading to one pole of the transformer while current is supplied to the other clamp by means of conductors 35 and 36 leading to the other pole of the transformer. The machine which I saw at the factory of the Warren Electric & Specialty Company in Warren, Ohio, in 1901, was the same as that shown in Exhibit "I", and was operated at that time to perform butt and spot welding in the manner as I have just described in connection with this Exhibit. I distinctly remember that at that time the space between the clamp arms 3 and 4 was not sufficiently deep to permit the sheets, to be welded together, to extend sufficiently low down when placed between the electrodes 31 and 32 when these etectrodes were straight, and so we bent the ends of these electrodes upwardly so as to allow the sheets of metal to enter between the electrodes to a sufficient extent to place the weld at the spot desired. This machine was used as I have described for some years subsequent to 1901 but in the use of the machine it was found by the operator that after the arms 17 and 18 had been thrown to force the clamp jaws together they would reach their limit of movement in this respect and to all intents and purposes were secured to the arms 3 and 4, and it became the practice to move these arms 3 and 4 by these levers 17 and 18 in forcing the clamps together to effect the weld. The arms 23 and 24 fell into disuse, and being in the way were removed. I do not know just when this occurred but it followed in the natural course of use of the machine sometime after it had been built in 1901. In the original machine the base plate was made in two pieces 1 and 2 which were separated by a piece of fibre to insulate them which extended substantially the whole length of the base plate. It was found however, that the drip from the welds under the pieces 31 and 32 was caught by the fibre and sometimes established a connection between the metal plates 1 and 2 which would require the cleaning out of this drip to get good operation of the machine. This hot drip would also burn the fibre. The fibre piece was therefore cut out directly under the spot where the weld was made which afforded

a large clearance for the insertion of sheets to be welded and also prevented the accumulation of the drip. The machine was used in this condition by the Warren Electric and Specialty Company and their successors the Peerless Electric Company for electric welding up to about five years ago, when, in order to improve the insulating qualities of the machine, I placed the base plates (1 and 2) upon a plate of slate. Also the conductors 35 and 33 were omitted as it was found that the conductors 34 and 36 were ample to carry the necessary current. The machine was in this condition when I saw it last which was last December at the works of the National Electric Welding Company, in Warren, Ohio. These changes made as I have noted were minor details made with a view to simplifying the machine and making the insulation more efficient, and did not change the manner of operation or the work produced, the machine being substantially the same and operating in the same way and producing the same work as when it was originally built in 1901.

I have seen various makes of machines used for spot welding and butt welding and in every case the butt-welding machines could be as well used for so-called spot welding, it being merely a question of whether a large weld or a smaller weld is desired, and as to the securing of sheets together by welds in a number of separated spots this merely means that the making of a weld in one spot is duplicated a number of times.

EVRAH C. LIPPS.

Subscribed and sworn to before me this sixth day of October, A. D. 1913.

BERTRAM D. CONNOLLY,
Notary Public, Wayne County, Michigan.

[Seal] My commission expires December 9, 1916.

AGREEMENT.

This agreement made between the Warren Electric & Specialty Co. of Warren, Ohio, party of the first part and E. C. Lipps party of the second part, Witnesseth that whereas party of the second part is possessed of a process of making incandescent lamp filaments which are said to be superior to the kind now in use by party of the first part, therefore, party of the first part hereby agrees to employ party of the second part to make such filaments for the period of one year from March 2d, '98, and to pay party of the

second part $1,000 payment to be made in twenty-six equal payments. Said party of the second part is to be provided with a suitable mixing room or laboratory in which to make said filaments and which room shall be entirely under his control and no one shall be permitted to enter it except by consent of the party of the second part except E. W. Gillmer, said party of the second part is to explain and does hereby agree to explain to E. W. Gillmer all formulaes and all manipulations required to properly make said filaments.

If at any time during the continuance of this contract said party of the second part should be discharged by party of the first part, and said party of the first part engage further in manufacturing these filaments according to processes divulged to E. W. Gillmer then party of the second part shall be entitled to receive from party of the first part $500.

Said party of the second part agrees to manufacture strictly high grade filaments and should such filaments not be sufficiently good to enable party of the first part to use them the contract may be cancelled by party of the first part giving notice to the party of the second part of thirty days.

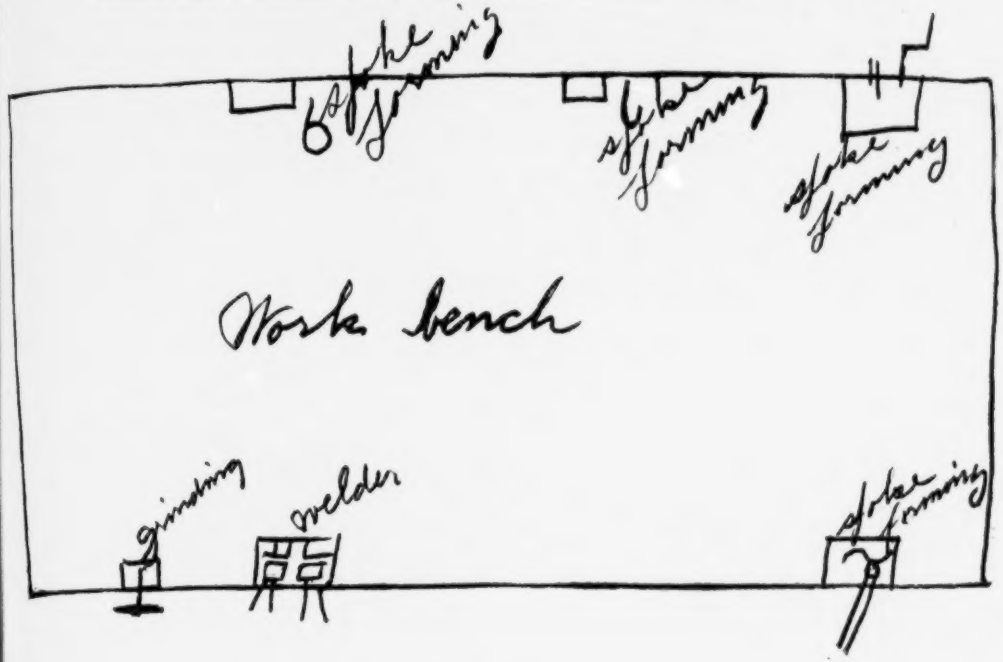
Party of the second part agrees to take into the room such assistance as are necessary to make filaments in such quantities as may be required by party of the first part.

THE WARREN ELECTRIC & SPECIALTY CO.
Elmer W. Gillmer, Secy & Treas.

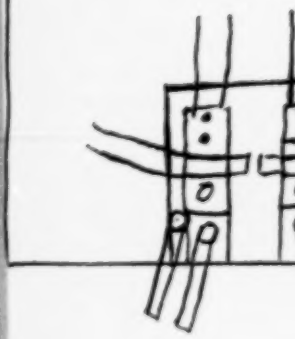
E. C. LIPPS.

Mar. 2d, 1898.

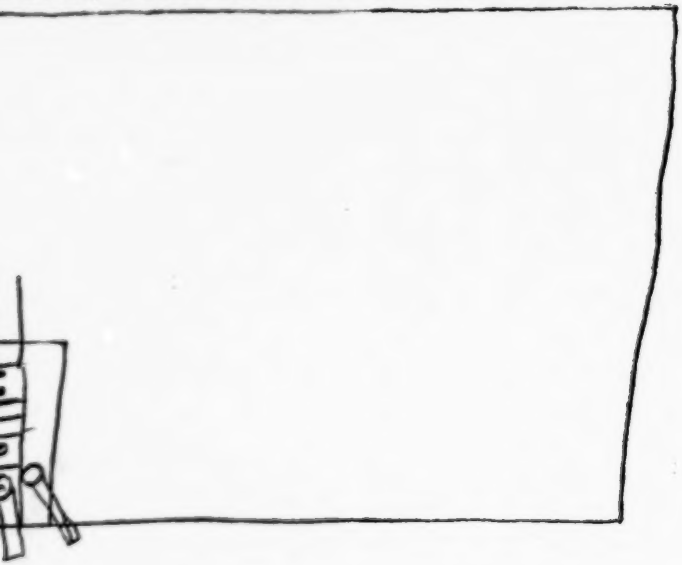
PLAINTIFF'S EXHIBIT No. 31, BREWER SKETCH OF WORK BENCH.



PLAINTIFF'S EXHIBI



T No. 32, BREWER SKETCH OF WELDING MACHINE.



PLAINTIFF'S EXHIBIT No. 33.—AFFIDAVIT OF MESSRS. BROWN, PENDLETON, PFILE, BETCHEL, McCURDY, PILZ, WOLCOTT, WAKEFIELD, ESTABROOK, BEAN, LEWIS, MEENELY, BETTIKER AND ULP, OBTAINED BY MR. HOWE.

In the United States District Court. District of Massachusetts.

In Equity

Thomson Electric Welding Company, et al.

vs.

Barney & Berry, Incorporated.

On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio

County of Trumbull ss

Mr. Milton W. Bechtel, being duly sworn, deposes and says as follows:

My name is Milton W. Bechtel; I am 43 (today) years of age; I reside at Warren, Ohio and am Secretary, Treasurer and General Manager of The Borden Company of Warren, Ohio.

The regular time record and pay-roll of The Borden Company show that Alfred Ulp entered the employ of The Borden Company on July 6th, 1901, and remained in the employ of that company until April 3rd, 1903.

MILTON W. BECHTEL

Subscribed and sworn to before me this 7th day of October, nineteen hundred and thirteen. Harry R. Williams

[SEAL] Notary Public.

In the United States District Court. District of Massachusetts.

In Equity

Thomson Electric Welding Company, et al.

vs.

Barney & Berry, Incorporated.

On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,

County of Trumbull.

Austin C. Pendleton, being duly sworn, deposes and says as follows:

My name is Austin C. Pendleton. I am 32 years of age and reside in Warren, Ohio. I am at present General Manager of the Trumbull Mfg. Co., engaged in business as general machinists. I have been employed by this Company since prior to 1901, and I distinctly recollect that we moved into our present quarters in the summer of 1901, on account of a fire which had occurred in the buildings which we formerly occupied. I further recollect that Evrah C. Lipps was employed by the Trumbull Mfg. Co. as a machinist in the summer of 1901 at about the time we moved into our present quarters.

I have made a search through the records of the Company but find that all records of employees of the Company, such as time books, checks and the like prior to 1902 have been destroyed. I find, however, from the books of the Company that four months rent of the old building was paid by the Company in June, 1901. This was probably payment of rent up to July 1st, 1901. This is the last entry of rent which appears in our records for this old building and corroborates my recollection that we moved to our present quarters in the summer of 1901.

AUSTIN C. PENDLETON.

Subscribed and sworn to before me this 10th day of October, A. D. 1913.

C. E. Stephens
Notary Public.

[SEAL]

In the United States District Court. District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull

Oscar C. Pilz, being duly sworn, deposes and says as follows:

My name is Oscar C. Pilz, am 30 years of age and reside in Warren, Ohio. I am employed by the Ohio Division of the National Electric Lamp Association, of the General Electric Company as a machinist. I distinctly recall of working in a rolling mill in War-

ren, Ohio, when Evrah C. Lipps asked me to go to Cleveland, Ohio, to aid him in the manufacture of electric fans.

This I did, and recall distinctly of being with Mr. Lipps several weeks in the summer time in Cleveland, Ohio, on this fan motor work. I should say that this was about thirteen years ago, but this is purely from recollection and I have no means at hand of verifying the date. On my return from Cleveland, Ohio, I entered the employ of the National Electric Lamp Association at Warren, Ohio.

OSCAR C. PILZ.

Subscribed and sworn to before me this 10th day of October, A. D. 1913. C. E. Stephens

[SEAL] Notary Public.

In the United States District Court. District of Massachusetts.

In Equity

Thomson Electric Welding Company, et al.

vs.

Barney & Berry, Incorporated.

On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,

County of Trumbull.

Robert J. Meenely, being duly sworn, deposes and says as follows:—

My name is Robert J. Meenely. I am 39 years of age and reside in Warren, Ohio. I am employed by the Warren Iron and Steel Company at Warren, Ohio. I remember clearly being employed by the Warren Electric and Specialty Company at Warren, Ohio, prior to the starting of the Peerless Electric Company, and prior to the building of the brick buildings which were built for the Peerless Company when it was started. I remember distinctly that the company was at that time the Warren Electric and Specialty Company, and not the Peerless Electric Company, which came along afterwards.

My work with the Warren Electric and Specialty Company at that time was on fans, in connection with which I bent up the stock to form the fan guards which were welded on an electric welding ma-

chine in the works of the company, and I did the welding of the ends of the fan guards together myself sometimes during that period. I do not recall having seen any other welding done on this machine except the welding of the ends of the fan guard rings together, but my work did not require me to make any other kinds of welds. As I was not at the machine all of the time and was off two or three months, and furthermore as I was not interested except to do my regular work upon it, it is entirely possible that others may have made other kinds of welds upon the machine than I have referred to. I recall that in using the machine to make fan guard welds, the rings were secured in the clamps by means of a pair of handles. The clamps were then moved towards each other by another pair of handles until the ends to be welded came together. The current was then turned on and after the stock had reached a welding heat the clamps were forced together further to force the hot metal together to make the welds and the current was cut off.

ROBERT J. MEENELY.

Subscribed and sworn before me this 8th day of November, A. D. 1913. Geo. T. Hecklinger,
Notary Public.

In the United States District Court. District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.

On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio
County of Trumbull, ss.

John S. Gilder, being duly sworn, deposes and says as follows:

My name is John S. Gilder. I am 38 years of age and reside in Warren, Ohio. I am at present employed by the Enterprise Electric Company of Warren, Ohio, as a transformer assembler.

Early in the year 1900 I came from the home of my parents in Kinsman, Ohio, and entered the employ of the Warren Electric and Specialty Co. in Warren, Ohio. This was in the early part of the

year 1900, in January or February, because I remember that it was cold and wintry.

When I first entered the employ of the Warren Electric & Specialty Co. in 1900, the Company was making its fan guards of brass. The rings of these guards at first had their ends secured together by inserting them in a sleeve and then securing them with solder.

Later it was the practice to dowel the ends of the rings together and then sweat them.

The next season, or the one after, that is in the year 1901 or 1902, the manufacture of iron fan guards was begun by the Company. At first they tried brazing the ends of the iron rings for the guards together, but that was not satisfactory and the welding of the iron guard rings by electricity was begun.

This electric welding was started either the same season that the use of iron fan guards was begun, that is in 1901 or 1902, or it may have been the next season after that. I have given these dates entirely from recollection and have no papers or memoranda by which I can verify them.

I recall in a general way seeing the electric welding machine which was used for welding the iron fan guards at the time I have mentioned. I recall this machine in a general way but could not go into details regarding it. I recall that there were two short handles for pushing the clamp jaws together to secure the work in them, and there were two larger handles for pushing the clamps toward each other to bring the stock together to weld it. My work at the time was that of general utility man. I helped form the pieces for the guards in the shop and sometimes would assist in the welding. The only kind of welding which I remember seeing done on the machine at that time was the welding together of the ends of the stock to make the fan guard rings. It was only occasionally, however, that I was in a position to know what kind of work was being done on the machine so that other kinds of work and characters of welds may have been made which I knew nothing about.

I have, on October 7th, 1913, examined a welding machine at the works of the National Electric Welder Co. at Warren, Ohio, and while I did not have sufficient to do with the machine so that all details were impressed on my mind, this appears to be the same

machine that I saw used at the factory of the Warren Electric & Specialty Co. for welding the rings of iron guards as I have described.

JOHN S. GILDER.

Subscribed and sworn to before me this 10th day of October, A. D. 1913.

C. E. Stevens,
Notary Public.

[SEAL]

In the United States District Court. District of Massachusetts.
In Equity

Thomson Electric Welder Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull.

Walter T. Wakefield, being duly sworn, deposes and says as follows: —

My name is Walter T. Wakefield, am 45 years of age and reside in Warren, Ohio. I am employed by the National Biscuit Company as their local representative.

I find on referring to my diary that in the years 1901 and 1902 I was employed by the Warren Electric and Specialty Company in Warren, Ohio. This accords with my recollection. I was employed by the Warren Electric and Specialty Company in charge of their japanning and lacquering department. I remember that at this time the cheaper grade of fans had iron guards, and that the ends of the guard rings were welded together. I recall that this was done at the time we moved from the building which we had formerly occupied, into the basement of another building which is now known as the buffing and japanning room of the Peerless Electric Company. This was in the year 1902 as nearly as I can recollect.

I remember at this time we moved into the basement of the new building, that the guards which I handled were electrically welded. We moved into the basement just after the building in which it was located was finished, and this was in the year 1902 as nearly as I can recollect. I recall that the basement we moved into was

referred to among the employees as "down in the hole" and it was often said that I "had moved down into the hole".

The electric welding on the fan guards I had at this time was done on an electric welding machine in the shop of the Warren Electric and Specialty Company (later the Peerless Company). I do not recall anything about this welder, as I was not brought into contact with it in any way and knew of its being there simply by the fact that I understood the welder was there and I had the electrically welded guards to work on.

WALTER T. WAKEFIELD.

Subscribed and sworn to before me on this 10th day of October, A. D. 1913.

C. E. Stevens,
Notary Public.

[SEAL]

In the United States District Court District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.

On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull.

David R. Estabrook, being duly sworn, deposes and says as follows:—

My name is David R. Estabrook, am 37 years of age, and reside in Warren, Ohio. I am employed by the Peerless Electric Company as superintendent. I started in the employ of the Warren Electric and Specialty Company, in their lamp factory in the year 1897 and have been in the employ of that company and its successors the Peerless Electric Company ever since.

In the years 1898–1899, the Warren Electric and Specialty Company started in the fan motor business. I recollect that this was during the summer of the Spanish-American War. The company a few years after started in the manufacture of a cheaper grade of fans having guards of iron and there was an electric welding machine in the factory by which the ends of the rings of the guards were welded together. As nearly as I can recollect this electric

welding machine and the welding of the iron fan guards was prior to the forming of the Peerless Electric Company, which was in the year 1902. I never knew of any welding done on this machine other than the welding of the fan guards which I have referred to, but it was only occasionally that I saw the machine and other welding might have been done on it without my knowledge. Sometimes when occasion required it, I might have performed some welding on the machine, but I do not recall the machine except in a very general way as I did not have any particular interest in it except to get the fan guard rings secured together.

DAVID R. ESTABROOK.

Subscribed and sworn to before me this 10th day of October, A. D. 1913.

Geo. B. Sawyer,
Notary Public.

[Seal]

In the United States District Court. District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull.

Robert W. Bean, being duly sworn, deposes and says as follows: My name is Robert W. Bean. I am 38 years of age and reside in Warren, Ohio. I am employed by the Peerless Electric Co. as a machinist. In October 1902, I went into the employ of the Sterling Electric Co. when it was started. The business of this company was manufacturing incandescent lamps. Prior to going to this Company I was employed by the Warren Electric & Specialty Co. During this employment with the Warren Electric & Specialty Co., I remember seeing an electric welding machine which had been designed by Mr. Fred P. McBerty, and which was in the works of the Company. I recall that this machine was used at that time for welding the iron rings for fan guards, and I remember at that time of making a set of forms for welding twelve inch by sixteen inch rings which were used in these guards. I also remember turning

up the copper jaws on the outside for the welding machine. All this took place prior to my going to the Sterling Electric Co. in October, 1912.

This electric welding machine was made about the time I was married, on Sept. 30th, 1900. It was shortly after this that the welder was made, it having been built in the latter part of 1900 or the first part of 1901. I entered the employ of the Warren Electric & Specialty Co., on Nov. 22nd, 1899. I do not recall any welding done upon this machine except the fan guard welding I have referred to, but the operation of the machine was not a part of my work, I having simply made some of the parts for it and helped construct the machine, so that it is entirely possible that other kinds of welding may have been performed which I knew nothing about.

Within the last six months I have examined an electric welding machine at the works of the National Electric Welder Co. at Warren, Ohio, and while this may differ in slight details, so far as I can see, it is the same as the machine which was built and operated in the works of the Warren Electric & Specialty Co., Warren, Ohio, in 1900 or 1901, as I have stated.

ROBERT W. BEAN

Subscribed and sworn to before me this 10th day of October, A. D. 1913.

Geo. B. Sawyer
Notary Public.

[Seal]

In the United States District Court. District of Massachusetts.
In Equity.

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio.
County of Trumbull.

Newton A. Wolcott, being duly sworn, deposes and says as follows: —

My name is Newton A. Wolcott. I am 38 years of age and reside in Warren, Ohio, and am General Manager of the Packard Elec

tric Company of Warren, Ohio. The business of this company is the manufacture of electrical apparatus. I graduated from Lehigh University in the year 1903, and in my vacation of the previous year, that is in the summer of 1902, I was employed in the shops of the Peerless Electric Company at Warren, Ohio.

I distinctly remember seeing at that time an electric welding machine, which I understood was devised by Mr. Fred P. McBerty and which machine was employed in welding together the ends of the iron fan guard rings of the Peerless Co. I do not recall having seen any other work performed on this electric welding machine, but it might easily have been done without my knowledge as my work did not bring me in contact with the electric welding and I saw it only occasionally. I have, however, a clear recollection of the appearance of the electric welding machine at the Peerless Company's plant in 1902. I have recently, on October 7th, 1913, inspected an electric welding machine at the works of the National Electric Welder Co., Warren, Ohio, and this machine operates in the same way and so far as I can see appears to be the same machine that was at the Peerless Co's works in 1902, although it was a good many years ago that I saw it at the works of the Peerless Company and the machine I saw on October 7th last, may differ in some small details from the machine I saw in 1902.

NEWTON A. WOLCOTT.

Subscribed and sworn to before me this 18th day of October, A. D. 1913.

CHAS. P. NYE,
Notary Public.

[SEAL]

In the United States District Court. District of Massachusetts.
In Equity.

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull,

Edward Bettiker, being duly sworn, deposes and says as follows: —

My name is Edward Bettiker, am 46 years of age and reside in Warren, Ohio, and am employed by the Peerless Electric Company at Warren, Ohio, as a machinist. On December 26th, 1900, I entered the employ of the Warren Electric and Specialty Company at Warren, Ohio, at that time leaving the Winfield Manufacturing Company. Within a few months after I entered the employ of the Warren Electric and Specialty Company, that is, in the early part of 1901, I recall making four copper forgings to construct the jaws for holding the stock in an electric welding machine, which had been devised by Mr. Fred P. McBerty. My work at the time was operating a press and as the press work was well ahead I recall striking for the blacksmith on this work. The blacksmith was Mr. Iles who is now dead. Mr. Edward Craft superintended the building of the welding machine, and Robert Bean had something to do with the construction of the machine. After the welding machine was completed it was taken up stairs and I had little to do with it afterwards but remember seeing the fan guard rings welded upon it.

I recall that the welder was built in the old frame building of the Warren Electric and Specialty Company before the brick buildings which were after put up by the Peerless Company (the successors of the Warren Electric and Specialty Company) were built; and I saw the fan guard rings welded with this machine in the old frame building and before the building of the brick buildings.

I have within the last week examined a welding machine at the works of the National Electric Welder Company in Warren, Ohio, and while it may differ in some slight details I believe that this is the same machine as that which was built and welded fan guards in 1901, as I have referred to.

EDWARD BETTIKER.

Subscribed and sworn to before me this 10th day of October, A. D. 1913.

GEO. B. SAWYER,
Notary Public.

[SEAL]

In the United States District Court. District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Michigan,
County of Wayne.

Alfred Ulp, being duly sworn, deposes and says as follows:

My name is Alfred Ulp. I am 43 years of age and reside in Detroit, Michigan. I am employed by the Packard Motor Car Company as a machinist.

I came to Detroit and entered the employ of the Packard Motor Car Company, October, 1903. For about two years previous to going with the Packard Company, in Detroit, I was employed by the Borden Company in the old S. W. Parks Building in Warren, Ohio. I left the Packard Automobile Company, then known as the Ohio Automobile Company, to go with the Borden Company, having entered the employ of this Ohio Automobile Company (Packard Company) in February, 1901. I recall that I left the employ of the Packard Company in the fall of 1901. Previous to entering the employ of the Ohio Automobile Company (Packard Company) in February, 1901, I had been working for the Warren Electric and Specialty Company in Warren, Ohio, for a year or more. I recall distinctly of seeing in the factory of the Warren Electric and Specialty Company, and before I went with the Packard Company in 1901, an electric welding machine which was employed for welding ends of the stock forming the fan guard rings together.

I was employed in the machine shop but sometimes went where the welding machine was and recall seeing welding of the character I have described done on it. It might be however that welds of other character were done on the machine as I was not directly concerned with this electric welding and only saw it incidentally as I might be passing, or as I might be called to assist someone in making welds at odd times.

ALFRED C. ULP.

Subscribed and sworn to before me this 22nd day of October, A. D. 1913.

Archie W. Reid
Notary Public.

[Seal]

My commission expires Oct. 15th, 1916.

In the United States District Court. District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull.

Charles B. McCurdy being duly sworn, deposes and says as follows:

My name is Charles B. McCurdy. I reside in Warren, Ohio, and I am superintendent of the Enterprise Electric Co. which is engaged in the manufacture of electric transformers.

I have examined the transformer data book in which is entered the date of construction, the date of winding and the date of shipment, and the consignee of each transformer made and shipped by the Warren Electric & Specialty Co., their successor, the Peerless Electric Co., and their successor the Enterprise Electric Co., all of Warren, Ohio, from the date of the first shipment on August 3rd, 1900 to Oct. 6th, 1906. This book shows that a 2 1/2 K. W. transformer was shipped to the Pneumatic Wheel Co. at Freehold, New Jersey on June 27th, 1900, that this transformer was returned and sent to the fan motor department of the Peerless Electric Co. on January 20th, 1901, that a 12-1/2 K. W. transformer was shipped to the Pneumatic Wheel Co. at Freehold, New Jersey on Sept. 27th, 1900 and was returned on March 18th, 1901, and that a 25 K. W. transformer was shipped to the Pneumatic Wheel Co. at Freehold, N. J. on Sept. 27th, 1900.

These are the only records of any transformers shipped to Freehold, N. J., and as I stated above, the records referred to include all of the transformers shipped by the Companies mentioned between the dates mentioned.

CHAS. B. MCCURDY.

Subscribed and sworn before me this 10th day of October A. D. 1913.

C. E. Stephens
Notary Public.

[Seal]

In the United States District Court. District of Masssachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull,

Rolland F. Pfile being duly sworn, deposes and says as follows:

My name is Rolland F. Pfile. My age is 36, I reside at Warren, Ohio, and I have charge of the lines and outside work of the Trumbull Public Service Co., at Warren, O. I came to Warren, Ohio from Ravenna, Ohio seven years ago this fall and entered the employ of the Peerless Electric Company at Warren, O. I was never in the employ of the Warren Electric & Specialty Co., nor was I ever in the works of that Company or had anything to do with it.

ROLLAND F. PFILE.

Subscribed and sworn to before me this 10th day of October A. D. 1913.

C. E. Stephens,
Notary Public.

[Seal]

In the United States District Court District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Ohio,
County of Trumbull.

Alton J. Lewis, duly sworn, deposes and says as follows:

My name is Alton J. Lewis, I am 44 years of age and I reside in Warren, Ohio. I entered the employ of the Warren Electric

and Specialty Company, Warren, Ohio, as a Plater and Buffer about the year 1900 and have been employed by them and their successor, the Peerless Electric Company, in this same class of work ever since that time. Shortly after I entered the employ of this company I saw an electric welding machine which was devised by Mr. Fred P. McBerty, and this machine was used for welding together the ends of the rings used in fan guard manufacture by this company. I recall that this welder and the welding was in the old frame building occupied by the Warren Electric and Specialty Company prior to the building of the brick buildings which were built by the Peerless Electric Company when they succeeded the former company.

I further recall that this welder and welding done upon it existed prior to the year 1902 for the reason that these welded fan guards were dipped and japanned by Walter Wakefield at the back of the old building before the japanning and dipping department was moved into the basement of the new building, and this department was moved into the basement of the new building in the year 1902. This I recollect distinctly as the moving into the basement was referred to as "moving into the hole". I recall that Walter Wakefield was in charge of the japanning and dipping department and wrote on the wall "moved into the hole 1902".

I do not recall any further welding done on this machine at that time than that I have already referred to as my work did not bring me in contact with this matter and I merely knew of this welding from occasional observation and general knowledge of the work going on in the factory. Other welding than that I have mentioned could have easily been carried on without my knowledge.

ALTON J. LEWIS.

Subscribed and sworn before me this 10th day of October, A. D. 1913.

Geo. B. Sawyer,

[Seal] Notary Public.

In the United States District Court. District of Massachusetts.
In Equity

Thomson Electric Welding Company, et al.
vs.
Barney & Berry, Incorporated.
On Harmatta Patent No. 1,046,066.

AFFIDAVIT.

State of Michigan,
County of Wayne, ss.

Frank G. Brown being duly sworn, deposes and says as follows:

My name is Frank G. Brown, age 40, and I reside at 237 Woodland Avenue, in the city of Detroit, State of Michigan. I am, at present employed by E. J. Kruce & Company, 322 Harper Avenue, Detroit, Michigan. The business of this company is that of tool makers and machinists, and my position with them is that of manager. I have been in my present position for approximately the two years last past.

I was formerly employed by the Warren Electric & Specialty Company, in their factory at Warren, Ohio, as a machinist. At the time of my employment by this company their business was the manufacture of electric fan motors, transformers and incandescent lamps. I first entered the employ of the Warren Electric & Specialty Company in May, 1899 and remained there until November, 1899. From November, 1899, until February, 1900 I was employed a portion of the time in the Tube Works at Warren, Ohio. In February 1900 I again entered the employ of the Warren Electric & Specialty Company where I remained until April 1900, when I left and took a position with the Packard Motor Car Company, at Warren. After entering the employ of the Packard Motor Car Company at Warren in April 1900, I remained with that company until July 1903. I then went to the Standard Engineering Company of Elwood City, Pa., where I stayed until January 1904. I then went with the Peerless Electric Company at Warren, O., where I stayed until April 1904, and then went into the factory of the National Electric Lamp Association at Warren, O., and remained there until July 1906. I then went into the employ of the Packard Motor Car Company, in Detroit, Michigan,

where I stayed until April 1911 and then took the position which I now hold. While I was still with the Packard Company in April 1901 I received word from Mr. Fred B. McBerty of the Warren Electric & Specialty Company requesting that I call on him at an early date. I called on Mr. McBerty at the works of the Warren Electric & Specialty Company at Warren, Ohio, on the following Sunday, which was a date previous to May 6th, 1901. At this time that I called on Mr. McBerty in April or May 1901, he requested me to return to the employ of the Warren Electric & Specialty Company offering me thirty cents per hour. I advised him that the machinists at the Packard Works had requested a reduction of time to nine hours per day and that while Mr. McBerty offered me more than I was getting at Packard's I did not think it would pay me to make the change, particularly if the reduction to nine hours per day went into effect, which I believed would be the case. The demand by the machinists for the nine hour day, which had been presented to the officials of the Packard Company, embodied the request that the nine hour day go into effect on May 20th, 1901. The Packard Company granted the nine hour day, and it went into effect on May 6th, 1901. I, therefore, know that the visit to Mr. McBerty was prior to May 6th, 1901, as it was prior to the going into effect of the nine hour day at the Packard Works.

Upon this visit to Mr. McBerty prior to May 6th, 1901, Mr. McBerty showed to me and explained an electric welding machine which was in the factory of the Warren Electric & Specialty Company. This welding machine was adapted for use either as a butt welder or a spot welder. By butt weld, I mean butting the ends of two pieces to be welded together and welding them together over the whole of their abutting surfaces. By spot welding I mean welding two thin sheets of metal together by overlapping them and welding them together in one or more spots, a welded spot being only a small portion of the overlapping area of the plates. To accomplish this butt welding, Mr. McBerty explained that the two pieces of stock to be welded together were placed in the welding clamps which were slidable toward and away from each other. The clamps were then moved toward each other so that the ends of the stock butted together. Current was then turned on and after

the stock had become heated at the joint, the two pieces were pressed together and the weld formed. To spot weld, instead of placing the stock to be welded in the clamps, a stiff copper conductor was placed in each of the butt welding jaws or chucks, these pieces extending toward each other, but having a small space between them — about one eighth of an inch. The opposing ends of these two copper conductors were flat and were reduced to an area less than the cross section of the main part of the conductor, the opposing faces being about an eighth of inch in diameter. To effect the spot weld two sheets of steel were lapped over and the over lapping portion placed between the electrodes formed at the ends of the copper conductors held in the butt welding clamps. The clamps were then moved toward each other as in the butt welding operation, which caused the electrodes to press toward each other upon opposite sides of the over lapped steel sheets. Current was then turned on in the clamps by closing the switch supplying the current to the welding transformer. Current would then pass through the clamps, copper conductors constituting electrodes, and the steel plates. The spot on the plates between the electrodes would then be heated to a welding temperature, and the weld was completed by forcing the electrodes towards each other thereby applying pressure at the spot where the weld was made, the spot being approximately the size of the face of the electrode — that is, about an eighth of an inch. The construction, arrangement and operation of the welding machine was fully explained and demonstrated to me by Mr. McBerty as I have described, on my visit to him in April or May, 1901, but no actual weld was made at that time as it was Sunday and no electric current was available as the factory of the Warren Electric & Specialty Company had its own electric plant which was shut down on holidays.

I recall distinctly that the welding machine had two pairs of arms, one pair for closing the clamps holding the work and the other pair for moving the clamps towards each other to press the pieces together in making the weld. In the butt welding the stock is secured in the clamps and forced together end to end by pushing the clamps towards each other as I have described. In the spot welding, the copper conductors forming the electrodes are placed

in the clamps and are forced against the plates to be welded by moving the clamps toward each other.

The sketch in the photographic print attached hereto and marked Exhibit A is a correct showing of the welding machine shown to me by Mr. McBerty in April or May 1901. My attention was particularly drawn to the welding apparatus and its work as Mr. McBerty and I were very friendly and he took a great deal of interest in showing it to me. Mr. McBerty had just built the machine and was very enthusiastic over using it in this Company's work, and I was interested as I had never seen electric welding before.

At the time I visited Mr. McBerty at the factory of the Warren Electric & Specialty Company in April or May, 1901, he showed me specimens of spot welding which had been done on the machine which I saw and referred to above. I particularly remember his showing me steel fan blades for electric fans which were welded to the arms of the fan centers by spot welds which took the place of the usual rivets for securing the blades. Attached hereto is a fan blade secured to an arm cut from a fan center. This is marked Exhibit B. This fan blade is welded to the arm by three spot welds and if it is not one of the identical fan blades welded to a center arm which was shown to me by Mr. McBerty when I visited him in April or May, 1901, it is precisely the same. I identify this Exhibit B as being the same as the device shown me by Mr. McBerty at the time mentioned as it appears in all respects to be the same and particularly the fan blade and arm have holes punched in them for rivets which are really unnecessary when the blade is welded to the arm. I recall distinctly that at the time Mr. McBerty stated that the fan blade and arm which were welded together were ones that had been punched for rivets in accordance with the practice of the company which had always employed rivets for this purpose, and their stock was prepared for them. Mr. McBerty told me at that time that he thought this spot welding would be of use in producing a cheaper fan which his company was putting out, and in which steel fan blades and centers were used in place of the more expensive brass blades and centers, and I clearly recollect saying that the parts were well secured together and of thinking that the welds were strong, reliable and practical. I learned later

that the securing of the fan blades to the center by spot welding was not adopted by the Warren Company for the reason that Mr. E. W. Gillmer the then Secretary, Treasurer and General Manager of the Warren Company, but who is now dead, would not sanction it. The reasons for this, as I understand them, were that the stock of fan blades and centers of the company had already been punched for rivets, and the spot welding of the blades to the centers would leave the rivet holes which did not give a good appearance. It was further thought inadvisable to lay in a new stock of unpunched centers and blades as this would practically double the stock of these parts which it would be necessary to carry. Since that time I have heard Mr. McBerty refer to the use of spot welding and in particular I recall that he purchased the transformer interests of the Peerless Electric Company, and at that time said he considered strongly the construction of spot and butt welders in connection with the manufacture of transformers. Since the time of my visit to Mr. McBerty in April or May, 1901, I have seen the machine which he then showed me in operation in actual welding work. I particularly remember that in the year 1906 just before I went with the Packard Company in Detroit, I saw the machine in use at the plant of the Peerless Company, in Warren, Ohio, successors of the Warren Electric & Specialty Company. It was being used in the regular work of the company for butt welding together the ends of the rings of the fan guards in the regular commercial fans of the Company. I also have seen this machine used for spot welding as I have described above and recall seeing this while I was employed in Warren after I returned from Elwood City in 1904 and before I went with the Packard Company in Detroit in 1906. This spot welding was not done on any commercial product of the company for as I understood it there was no commercial product of the company to which it was adapted as a commercial proposition. This spot welding which I saw done was done by the people interested in the machine to show that this manner of securing parts together was thoroughly successful and practical when any construction to which it was adapted commercially should arise in the work of the company. I have not seen this machine in operation since 1906 as I severed my connection with the Peerless Company in July, 1906.

Although my trade is that of a machinist I have been employed

in factories where electric lamps, transformers, fan motors and other electrical apparatus were manufactured for a good many years so I have been brought in contact with electrical apparatus to a large extent, and I understood clearly the operation of the machine in electric butt and spot welding as described to me by Mr. McBerty and as referred to by me above.

I further am able to fix the time when I called on Mr. McBerty and saw and had explained his welding machine for butt and spot welding as early in the year 1901 from the fact that this visit occurred while a demand was being made by the men of the Packard Company for a nine hour day, and at this time I was a member of the union known as the International Association of Machinists and was regularly paying my dues. My due books in this Union, which two due books I hereto attach as Exhibit C, show that my last dues were paid on September 6th, 1901, these being my August dues.

I further remember there was a labor disturbance at the Packard Works beginning in October, 1901, the same fall that I dropped out of the machinists union. This trouble was settled about the first of December that year and my visit to Mr. McBerty at which he demonstrated this welding machine, as I have referred to, was in the spring before this labor disturbance occurred. I further recollect that the time of my visit to Mr. McBerty when he explained his welding machine to me, as I have referred to above, was at a time that I was building a house on Atlantic Street, in Warren, O. I moved into this house in June, 1901. Before the house which I was building was ready for me, I was obliged to move out of the house in which I had been living, and took temporary rooms until such time as my house should be ready for me and I recall that it was during my occupancy of these temporary rooms that I visited Mr. McBerty and saw the welding machine and that the nine hour day went into effect at the Packard Works, as I have referred to above.

FRANK G. BROWN

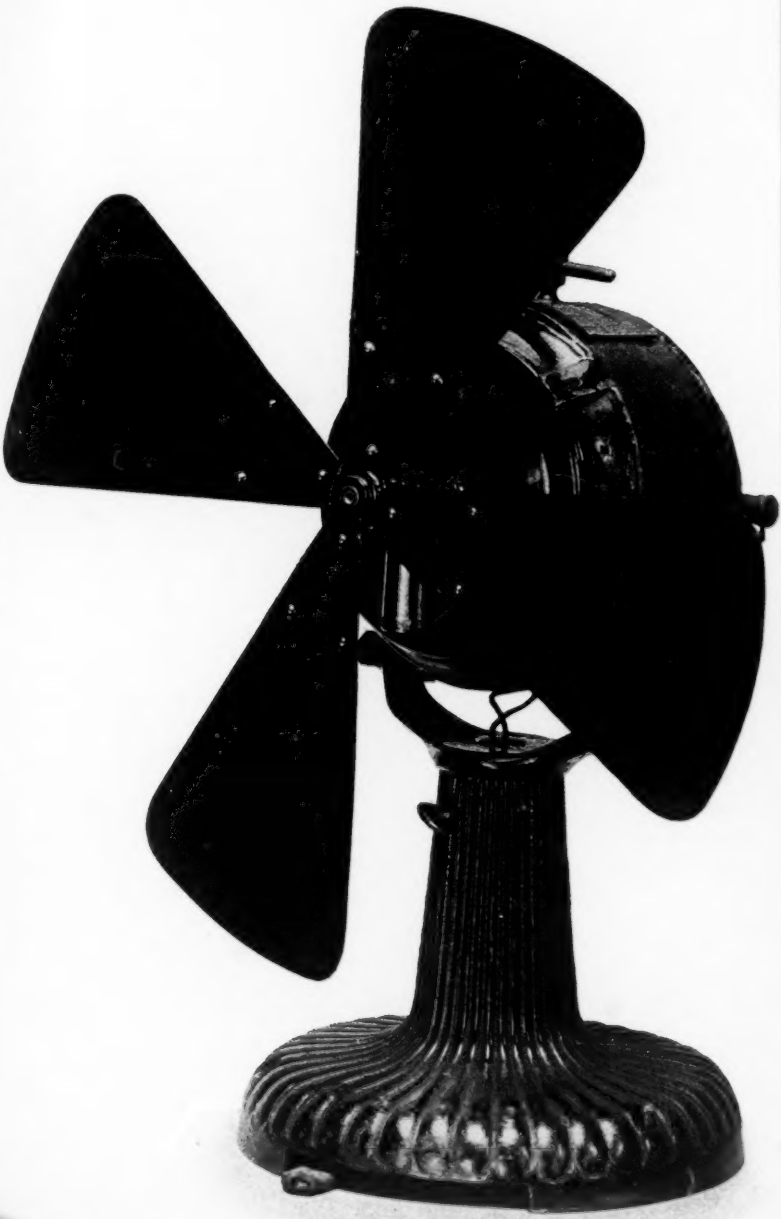
Subscribed and sworn before to me this 6th day of October, A. D. 1913.

Bertram D. Connolly

[Seal] Notary Public Wayne County, Michigan

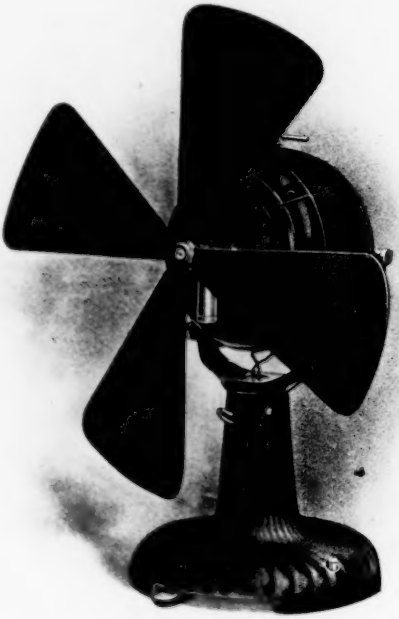
My commission expires December 9, 1916.

PLAINTIFF'S EXHIBIT No. 34.



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PLAINTIFF'S EXHIBIT No. 37.



IN THE

District Court of the United States

FOR THE EASTERN DISTRICT OF MICHIGAN.

SOUTHERN DIVISION.

IN EQUITY.

ON HARMATTA PATENT NO. 1,046,066.

THOMSON SPOT WELDER COMPANY, Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

AMENDED ANSWER.

The Amended Answer of FORD MOTOR COMPANY, defendant to the Bill of Complaint of THOMSON SPOT WELDER COMPANY, plaintiff:

This defendant answering says:

1. Defendant has no knowledge as to the citizenship and residence of the plaintiff, nor as to the incorporation of the plaintiff, as in the bill of complaint alleged, and leaves plaintiff to make such proof thereof as it may be advised. Defendant admits that it is a corporation, created and existing under the laws of the State of Michigan and that it is a citizen and inhabitant of said State. Defendant admits that this is a suit in Equity arising under the patent laws of the United States.

2. Defendant admits the issue of letters patent of the United States, No. 1,046,066, dated December 3, 1912, to Thomson Electric Welding Company, as the assignee of Johann Harmatta, but denies all the other allegations in Paragraph 2 of the bill of complaint, and leaves the plaintiff to make such proof thereof as it may be advised.

3. Defendant is not informed, save by the bill of complaint, whether or not the plaintiff has any such rights or interests as are set forth in Paragraph 3 of said bill and therefore denies all of the allegations of said Paragraph 3, and leaves the plaintiff to make such proof thereof as it may be advised.

4. Defendant denies that it has made, used or sold any articles covered by said letters patent No. 1,046,066 or that it has practiced the process set forth and claimed in said letters patent, in this judicial district or elsewhere, and denies that it has in any respect infringed said letters patent or any rights of the plaintiff therein, and denies that it has in any way damaged the plaintiff.

5. Defendants, upon information and belief, denies that the

Thomson Electric Welding Company, of Lynn, Massachusetts, at
id Lynn and elsewhere in the State of Massachusetts.
Sebastian Z. DeFerranti, of Hampstead, London, N.W., England,
said Hampstead and elsewhere in the Kingdom of Great Britain.

(d) Because, for more than two years prior to the application of
e said Johann Harmatta for said letters patent No. 1,046,066,
e said invention or improvements claimed in and covered by said
tters patent were in public use and on sale in the United States, by
e following named persons, or concerns, at the following named
aces, viz:
Fred P. McBerty, of and at Warren, Ohio.
Warren Electric & Specialty Company, of and at Warren, Ohio.
Central Oil & Gas Stove Co., of and at Gardner, Massachusetts.
Elihu Thomson, of and at Lynn, Massachusetts.
Thomson Electric Welding Company, of and at Lynn, Massa-
usetts.
William Robinson, of and at Boston, Massachusetts, and at
rooklyn, New York.
Adolph Rietzel, of and at Lynn, Massachusetts.

(e) Because, the said Johann Harmatta was not the original,
ue and first inventor of the inventions or improvements set forth
id claimed in said letters patent No. 1,046,066, but that said let-
rs patent were surreptitiously and unjustly obtained for that
hich was in fact invented by another, to-wit, by Sebastian Z.
eFerranti, of Hampstead, London, N.W., England, who was
sing reasonable diligence in adapting and perfecting the same.

(f) Because, the subject matter set forth and claimed in said
tters patent No. 1,046,066 was not set out in the application for
id letters patent No. 1,046,066, as filed, as the invention of said
ohann Harmatta and was not covered by the oath of said Johann
larmatta to said application, as required by the Statutes of the
Inited States and the Rules of Practice of the United States Patent
)ffice, made pursuant thereto, in such case made and provided,
ut such subject matter was inserted by amendment to said applica-
on, without the authority or sanction of said Harmatta, and with-
ut his oath as required by said Statutes and Rules.

(g) Because, of the abandonment to the public of the subject
natter of said letters patent No. 1,046,066 by reason of the delay of
ne owner of the application for said letters patent to assert claim
) such subject matter until more than a year after knowledge of
ne issue and publication of letters patent No. 928,791, granted
uly 20, 1909, to the predecessor in title of the plaintiff, Thomson
lectric Welding Company, as the assignee of Adolph F. Rietzel;
nd defendant avers that the plaintiff is now estopped to assert the
alidity of said letters patent No. 1,046,066 as against this defend-
nt or as against the public generally by reason of such delayed
ssertion of claim and such abandonment.

(h) Because, in view of the knowledge of persons skilled in the art at the date of the alleged invention of the said Harmatta, the things attempted to be claimed and covered by said letters patent No. 1,046,066, did not embody or involve any substantial variation or change from said prior art, and did not involve the exercise of the inventive faculty or constitute patentable subject matter.

(i) Because by reason of the representations and declarations made by the plaintiff or its predecessor in title to the Commissioner of Patents that Adolph F. Rietzel was the prior inventor over Johann Harmatta, the patentee of the Harmatta patent in suit, in respect of the subject matter of the said Harmatta patent, as shown by the record of the application for the Rietzel patent No. 928,701, and by the record of the proceedings in Patent Office Interference No. 31,792, between the said Rietzel patent and the application for the said Harmatta patent, the plaintiff is now estopped to deny the prior inventorship of the said Rietzel over said Harmatta and also to assert the validity of said Harmatta patent as against this defendant or any other member of the public.

9. Further answering, defendant is informed and believes, and therefore avers, that said letters patent No. 1,046,066 are now involved in an interference proceeding in the United States Patent Office with a pending application of the hereinabove mentioned Sebastian Ziani De Ferranti, which proceeding is known and designated as Interference No. 36,709, De Ferranti v. Harmatta, and is pending and undetermined; that in said interference proceeding the said De Ferranti claims priority of invention over Harmatta in respect to the subject matter of said Harmatta patent No. 1,046,066; that defendant claims the benefit of all the rights of said De Ferranti in respect of said invention, application and interference proceeding, and of all the rights of said De Ferranti under his aforesaid British letters patent No. 11,921, of May 25, 1903, and under his United States letters patent No. 874,398, of December 24, 1907, and No. 1,148,221, of July 27, 1915, and under Section 4887 of the Revised Statutes of the United States, and the International Convention, by virtue of a license from said De Ferranti to this defendant.

10. Further answering, defendant denies that the plaintiff is entitled to any injunction, provisional or permanent, or to any accounting or recovery, or other relief, or to any decree as prayed for in the bill of complaint, and prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

FORD MOTOR COMPANY
By BARTHEL, FLANDERS & BARTHEL,
Its Solicitors.

MELVILLE CHURCH,
Of Counsel.

DISTRICT COURT OF THE UNITED STATES.

EASTERN DISTRICT OF MICHIGAN, SOUTHERN DIVISION.

THOMSON SPOT WELDER COMPANY, Plaintiff

vs.

FORD MOTOR COMPANY, Defendant.

IN EQUITY ON HARMATTA PATENT NO. 1,046,066.

STIPULATION.

It is hereby stipulated and agreed by and between counsel for the respective parties hereto, subject to the approval of the court, as follows:

I. That the usual printed Patent Office copies of United States and foreign patents may be offered and received in evidence with the same force and effect as the originals or duly certified copies thereof, subject, however, to corrections by comparison with such originals or certified copies; and that the date of application printed upon any such copy of patent shall be *prima facie* evidence of the date of the application for such patent.

II. That either party may take the depositions of witnesses (including experts whose testimony shall be directed to matters of opinion), under the provisions of Sections 863 *et seq* of the Revised Statutes of the United States; those taken by the plaintiff in support of its *prima facie* case to be taken within 30 days of the date hereof; those of the defendant within sixty days after the closing of plaintiff's *prima facie* case and those of the plaintiff, in rebuttal, within thirty days after the closing of the depositions so taken in behalf of the defendant.

III. That the court be requested to fix a day for trial, to enable any witnesses that either party may desire to be called to be examined in open court, in July 1918, or at such earlier time as the business of the court may permit.

J. L. STACKPOLE,
Council for Plaintiff.
MELVILLE CHURCH,
Counsel for Defendant.

Boston, Massachusetts, Feb. 20, 1918.

DISTRICT COURT OF THE UNITED STATES.

EASTERN DISTRICT OF MICHIGAN, SOUTHERN DIVISION.

THOMSON SPOT WELDER COMPANY, Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

IN EQUITY ON HARMATTA PATENT NO. 1,046,066.

DEPOSITION of William E. Smith, de bene esse, taken in behalf of defendant by agreement of counsel and under the statutes of the United States, and equity rules at the office of Webber & Turner, 7th floor, Renkert Bldg., Canton, Ohio, beginning at 10:30 A. M. Friday April 19, 1918, before Edward R. Sterling, Notary Public in and for Stark County, Ohio, a duly qualified officer.

Appearances: J. L. STACKPOLE, ESQ., for plaintiff;
A. S. PATTISON, ESQ., for defendant.

WILLIAM E. SMITH.

WILLIAM E. SMITH, a witness called by and on behalf of defendant, being first duly sworn, deposes and says:

Direct examination by MR. PATTISON:

Question 1. Please state your name, and residence.
Answer. William E. Smith, 415 Front St., Warren, Ohio.
Q. 2. What is your age?
A. I'll be 44 years old the 16th of May next.
Q. 3. What is your present occupation?
A. I am Captain of Engineers, United States Reserves.
Q. 4. What was your occupation before you entered the Army?
A. I was an electrical engineer.
Q. 5. Where did you begin your electrical education?
A. At the Warren Electric & Specialty Co.
Q. 6. Just state the place, Mr. Smith.
A. Warren, Ohio.
Q. 7. When did you begin this work at that place?
A. In January, 1900.
Q. 8. Are you a married man?
A. Yes.
Q. 9. When were you married?
A. In September, 1899.
Q. 10. Where were you employed at that time?
A. At the Western Reserve Pottery Co., Warren, Ohio.

Q. 11. And was it the January following your marriage that you went to work at the Warren Electric & Specialty Co.?

A. It was.

Q. 12. What kind of work did you do at the factory of the Warren Electric & Specialty Co. when you went there in January, 1900?

A. I was employed there as an armature winder, but at times when there was no armature winding I was employed at other work, in the fan motor department of the Warren Electric & Specialty Co.

Q. 13. What was the product of the Warren Electric & Specialty Co. in 1900?

A. They were manufacturing fan motors, transformers, and electric incandescent lamps.

Q. 14. Were these electrically driven fans?

A. They were.

Q. 15. What work did you do in the manufacture of these electric fans?

A. Principally armature winding.

Q. 16. What kind of metal was used in the fans blades that were manufactured at the Warren Electric & Specialty Co. for the fan season of 1900?

A. Brass.

Q. 17. Was any change made in the metal used for the fan blades at the Warren Electric & Specialty Company while you were there?

A. Yes.

Q. 18. State, if you know, when this change was made, and what kind of material was used in this change?

A. I don't know exactly when the change was made. But it was made previous to the beginning of the manufacturing season of 1901. At about that time they began to manufacture fans with steel blades.

Q. 19. What type of fan, if you know, were these steel blades used in?

A. They were used in what was known in the factory as the cheap fan.

Q. 20. In this cheap fan, what material were the fans guards made of?

A. They were made of steel.

Q. 21. For what season was this cheap fan first put on the market?

A. For the season of 1901.

Q. 22. Was that the first fan put out by the Warren Electric & Specialty Company while you were there, that had the steel blades and the steel fan guards?

A. So far as I know, it was.

Q. 23. State, if you know, of what material the spiders or arms of the fan blades of this cheap, 1901 fan, was composed.

A. They were made of steel.

Q. 24. Who, if you know, designed this cheap fan for the Warren Electric & Specialty Company?

A. F. P. McBerty.

Q. 25. How long have you known Mr. F. P. McBerty?

A. I have known him since January, 1900.

Q. 26. Where does he live?

A. He lives in Warren, Ohio.

Q. 27. What were the duties of Mr. McBerty at the Warren Electric & Specialty Company while you were there?

A. When I first went to work for the Warren Electric & Specialty Company, Mr. McBerty had charge of the designs of machinery used in the manufacture of their products. And he also had charge of any changes in design that was made in the product itself. He was in charge of the power plant. Later he was in complete charge of the whole factory.

Q. 28. Did you see any electric welder at the Warren Electric & Specialty Co. while you were there?

A. Yes.

Q. 29. When did you first see it?

A. I saw it first when it was set up in the factory in January of 1901.

Q. 30. Who designed, if you know, this welder?

A. F. P. McBerty.

Q. 31. In what department of the factory did you see this welder in January of 1901?

A. It was set up in the Fan Motor Department.

Q. 32. What was it used for?

A. It was used for welding together the ends of steel rings used in the guards for the cheap fans.

Q. 33. Was that the only kind of welding you saw this electric welder do?

A. It was not.

Q. 34. What other kind or kinds of welding did you see it do?

A. I saw it used for welding blades to the spiders for the fans used on the cheap fan. It was used by myself and others in welding together scrap fan blades and various things which we found there in the factory, which we welded together.

Q. 35. How were the steel blades of this cheap fan welded to the fan spiders with this machine?

A. The fan blade and spider were placed between the copper electrodes, which were held in the jaws of the welder. By means of cam levers the electrodes were brought to bear upon the blade and spider, holding them in position. The current was then turned on, and at the same time force was applied to the cam levers. When the work had been brought up to the required heat, the current was switched off.

Q. 36. What kind of a weld did this make?

A. I don't just get what you mean by that question, Mr. Pattison.

Q. 37. Please describe the kind of weld that was made, as I understand you, between the fan blade and the spider.

A. The work was so positioned between the electrodes that when they were brought together and the current turned on, a small weld was made between the spider and the fan blade.

Q. 38. State the size of the [illegible], as you remember, made as you described.

A. It was from 1/8 to 3/16 of an inch in diameter.

Q. 39. How many such welds were made between the fan blade and the spider?

A. Three welds were made on each blade, and on each arm of the spider.

Q. 40. Was the fan blade and spider welded between these three welds?

A. It was not.

Q. 41. When did you see fan blades and spiders first welded, as you have described?

A. A short time after the welder was set up in the fan motor department.

Q. 42. And when was the welder set up in the fan motor department?

A. In January, 1901.

Q. 43. State the period of time you mean by the expression "shortly after the welder was set up."

A. A few days.

Q. 44. About how far apart were these three welds between the fan blades and spiders?

A. They were about an inch apart.

Q. 45. How many blades did each of the fans have?

A. They had four blades.

Q. 46. Did you see any fans in which all the blades were welded with this machine, as you have stated?

A. I did.

Q. 47. Approximately how many completed fans did you see so welded?

A. At least a dozen. Perhaps more than that.

Q. 48. How were the blades attached to the spiders, when not welded, as you have described?

A. They were attached by means of rivets.

Q. 49. Were rivets used when the blades and spiders were welded together?

A. Rivets were not used in that case.

Q. 50. Then did these three welds, you have referred to, take the place of and serve the purpose of rivets previously used?

A. They did.

Q. 51. You have stated that you, yourself, operated this welder. What kind of welding did you do with it?

A. I welded the rings together that were used in the fan guards, other pieces of steel such as nails, also scrap fan blades, and other pieces of sheet steel, that I found in the factory.

Q. 52. Have you done any welding with this machine since you was employed at the Warren Electric & Specialty Co?

A. I have.

Q. 53. When did you do this welding with this machine?

A. About a year ago.

Q. 54. Please produce, if you can, some of the welding which you did with this machine about a year ago.

(Objected to as immaterial.)

A. These are two of the pieces that I welded about a year ago.

(Witness produces two pieces so welded.)

Q. 55. State whether these welds in these samples are the same as the welds that you made with this machine in January 1901.

A. They appear to be the same as those that I made at that time.

Q. 56. Were you interested in this welder in January, 1901?

A. Yes.

Q. 57. To what extent?

A. At that time I was not well informed on electrical subjects, and I was very much interested in the machine, as I desired to take up the study of electricity; and because of that, I took a great interest in the machine.

Q. 58. Did you examine and operate the machine often during the fan season of 1901?

(Question objected to as leading.)

A. I did.

Q. 59. State approximately how often you examined and operated this electrical welder during the fan season of 1901.

A. I examined and operated it at almost every opportunity that I had during the early part of that season.

Q. 60. Can you state what part of the day you operated the machine, and why?

A. I usually operated it during the lunch hour. That was the only time which the machine was not in use by the regular operator.

Q. 61. State as nearly as you can, how many times you operated the machine during the fan season of 1901.

A. I should say a hundred times.

Q. 62. Was this McBerty welder the first electric welder you had ever seen?

A. It was.

Q. 63. Was this machine in the room where you worked, or in a different room?

A. It was in the room where I worked.

Q. 64. During the fan season of 1901, did you make many such welds as are shown in the samples that you have produced?

A. Yes.

(Mr. Pattison: The samples produced by the witness as illustrative of the welding done by him on the McBerty machine during the 1901 fan season are marked for identification "Exhibit A, Smith's samples of welding done on McBerty machine.")

(The exhibit is objected to as immaterial, as the witness has stated that the samples were made last year; and, for the same reasons, objection is made to the remarks of counsel that they represent the style of work done by the witness in 1901.)

Q. 65. I call your attention to these samples again, and ask you to examine the welds, and state if they differ in any respect from welds which you say you did on the McBerty machine in 1901. (Meaning "Smith's samples of welding done on McBerty machine.")

(Objected to as leading.)

A. As far as I can see, they are the same.

Q. 66. Did you observe other employees at the Warren Electric & Specialty Company manifesting interest in this electric welder in 1901?

A. I did.

Q. 67. Please name some of the employees that you observed manifesting interest in this welder.

A. Ed Craft, E. C. Lipps, Harvey Eckenrode, John Gilder, John McDonald, Clyde Storier. There were also others.

Q. 68. Do you know whether catalogs were issued by the Warren Electric & Specialty Company while you were there?

A. I do.

Q. 69. Did you see any of the catalogs that were issued while you were there?

A. Yes.

Q. 70. Would you recognize catalogs if they were shown to you?

A. I would.

Q. 71.

(Mr. Pattison: I hand you what appears to be two catalogs, and ask you to state what they are.)

A. They are catalogs issued by the Warren Electric & Specialty Co.

Q. 72. For what seasons?

A. Seasons of 1900 and 1901.

Q. 73. I hand you the catalog which appears to be for the season of 1900, and ask you whether you recognize it as the catalog for that season.

A. I do.

(Mr. Pattison: The catalog just recognized by witness as Warren Electric Specialty for season of 1900 is marked for identification, "Exhibit 1, Warren Electric Specialty Co.'s 1900 fan catalog.")

Q. 74. Please examine this catalog and state whether the cheap fan, to which you have referred, is contained in this catalog

A. The cheap fan is not shown in this catalog.

Q. 75. I hand you a catalog, which purports to be for the year 1901, and ask you what you recognize it to be.

A. I recognize it to be Fan Catalog of the Warren Electric & Specialty Co. for 1901.

(Mr. Pattison: The catalog just recognized by the witness is marked for identification "Exhibit 2, Warren Electric Specialty Co's 1901 catalog.")

Q. 76. Please examine this catalog, and state whether you find in it a representation of the cheap fan, to which you have referred, meaning the last catalog, Exhibit 2.

A. I find cuts of the cheap fan in this catalog on page 17.

Q. 77. What, if anything, in these catalogs enable you to say as to the time the cheap fan you have referred to, was first put on the market?

A. From the construction of the fan as shown in the cut, I recognize them as the cheap fan, which was made in 1901, and put on the market that same season.

Q. 78. Do you mean that that was the first season that it was put on the market?

A. I do.

Q. 79. What type of fan in this 1901 catalog is the cheap fan?

A. G-1 and G-2, shown in this catalog.

Q. 80. Wherever in your deposition you have referred to the "cheap fan," state whether you have reference to the G-1 and G-2 type, appearing on page 17, of Exhibit 2 of the 1901 catalog.

A. Type G-1 and G-2 are the fans which I have referred to as the "cheap fan."

Q. 81. State whether these catalogs enable you to say what year the McBerty welding machine was first put in use.

A. In so far as they show that the fan which was known as the "cheap fan" was placed on the market during that season, and from my knowledge that the welder was designed and used for the purpose of manufacturing these fans, they do.

Q. 82. What year do these catalogs enable you to say that the McBerty welder was built and first used?

A. It was built in the latter part of 1900 and was first used in the early part of 1901.

Q. 83. In 1901, when you saw these welds in spots like your sample marked for identification "Exhibit A," and which you have referred to in your testimony as being welded by you and others,

did you at that time regard these welds as effective to serve the purpose of rivets?

A. I did.

Q. 84. What tests, if any, did you personally make in 1901 to determine the strength of the welds that you made like those shown in "Exhibit A," sample?

A. I tore the pieces apart to see how strong the welds would hold them together.

Q. 85. What was the result of this test?

A. I found that the metal would tear out of the piece around the weld before the weld would break.

Q. 86. Did you or not make only one of such tests?

A. I made several such tests.

Q. 87. What conclusion did you reach from these tests in 1901, as to the success and effectiveness of these welds?

A. I considered that they were as good and effective as the rivets which were ordinarily used.

Noon recess.

Q. 88. I call your attention to a machine marked for identification "Exhibit B," and ask you whether you recognize it?

A. I do.

Q. 89. What is it?

A. It is the welding machine designed by Fred P. McBerty, which was used in the Fan Department beginning January 1901.

Q. 90. Is this the machine on which you say you made welds in spots January 1901?

A. It is.

Q. 91. Do you recognize it as the original machine?

A. I do.

Q. 92. Did the machine, when you operated it in 1901, have a switch for opening and closing the circuit?

A. It did.

Q. 93. How was this switch operated?

A. It was a foot-operated switch.

Q. 94. Do you find a foot-operated switch on this machine, "Exhibit B"?

A. I do.

Q. 95 I show you two photographs marked for identification "Exhibits C and D," and ask you whether these photographs represent the way you saw the machine used in January, 1901, for welding the blades to the spiders, in the cheap fan?

A. They do.

Q. 96. I hand you a photograph marked for identification "Exhibit E," and ask you what it is.

A. It is a photograph of the welding machine designed by Fred P. McBerty, marked for identification "Ex. B."

Q. 97. Is this the machine on which you did welding in spots, as you have described, in January 1901?

A. It is.

Q. 98. Do you know whether the copper rods or electrodes clamped in this machine are the same ones that were in the machine when you operated it in January, 1901?

A. I do not.

Q. 99. Examine these copper rods or electrodes in this Ex. B, McBerty machine, and state whether how, if in any respect, they differ in construction from the rods or electrodes that were in the machine when you operated it, and did welding in January 1901?

A. The rods are about the same diameter and length, as those used in the machine when I operated it in 1901.

The points, however, were not so blunt as those that are now in the machine.

Q. 100. How about the four levers that are in this machine, Exhibit B?

A. The two upper levers now on the machine are the ones that were used on the machine in 1901. The lower levers are about the same shape as those that were on the machine in 1901, but they appear to have been made since that time.

Q. 101. What was the function of the upper levers on the machine in 1901, when you operated it?

A. The upper levers were used to force the jaws against the steel rings, which were welded at that time.

Q. 102. What function did they perform when the copper rods were used, when you operated it in January, 1901?

A. They were used to force the jaws against the copper rods and to hold them in position while the cap screws, which hold the jaws, were screwed down.

Q. 103. What was the function of the two lower levers in January 1901, when you operated it?

A. They were used to bring the points in contact with the parts to be welded, and by added pressure at the proper time to complete the weld.

Q. 104. What is this thing or device that stands vertical on the platform of this machine?

A. It is a transformer.

Q. 105. Was that in the machine when you operated it in January, 1901?

A. It was a part of the machine.

Q. 106. How about the cables?

A. They are the ones that were used at that time.

Q. 107. How about the jaws, which in one instance you say were used to clamp the copper rods or points, and in another instance to clamp the rings, when welding was done.

A. The jaws are the same ones that were used at that time.

Q. 108. Of what material were the things you once referred to as "points" when you operated the machine in January 1901?

A. Copper.

Q. 109. Are these "points" the same elements that you have sometimes referred to as "electrodes" and "copper rods"?

A. They are the same.

Q. 110. Was this Exhibit B, McBerty machine, located in the factory, where it could be seen by anyone, in January 1901?

A. It was so located that it could be seen by anyone in the Fan Motor Department.

Q. 111. State whether or not these welding operations made, as you have described, in January 1901, were or were not openly conducted.

A. They were openly conducted.

Q. 112. Was there any effort or intention to conceal this machine or its operations in January 1901?

A. There was none. It was shown to all visitors.

Q. 113. Was this, likewise, true during the whole time you were at the Warren Electric & Specialty Co.?

A. It was.

Q. 114. To what extent were the employees of the Warren Electric & Specialty Company and outsiders permitted to see this Exhibit B machine, and its operation in welding, as you have described, in the Fan Department of the Warren Electric & Specialty Company, in 1901?

A. There was no attempt made to keep the machine or any work done on it secret.

Q. 115. Do you mean by this that any employee of the Warren Electric & Specialty Company might examine the machine, and its operation, and that outsiders might do the same during the year 1901?

A. I do.

Q. 116. To what extent did you observe employees of the factory examine the machine and its operation?

A. During the lunch hour, a great many of the employees operated the machine, and watched others operate it. At other times, during working hours, it was used by employees, who happened at the time to be not engaged in their regular duties.

Q. 117. Do you recall seeing anyone from the outside examine this machine, other than the employees?

A. Yes.

Q. 118. Was this during the first year of its installment at the factory?

A. It was.

Q. 119. State whether or not the examination by employees of the company and outsiders, other than the employees, included the use of the machine for welding in spots, as you have described.

A. It was examined by the employees, including the use of the machine for welding in spots.

Q. 120. Do you know about outsiders during that period of time?

A. I don't know whether outsiders were shown this operation or not.

Q. 121. I show you a blue print marked for identification, "Exhibit F," and ask you whether that blue print properly shows the

plan of the floor of the building, where this machine was built and operated in January 1901?

A. It does, with a few exceptions. A door was in the building near the place marked "punch press." There was also a toilet room at the right of the door into the packing and stock room.

Q. 122. How about the location of the part marked "welding bench?"

A. My recollection is that the welding bench was nearer the center of the room, than shown on the blue print.

Q. 123. When did you leave the employment of the Warren Electric & Specialty Co.?

A. I was with the Warren Electric & Specialty Co. when its fan motor and transformer business was taken over by the Peerless Electric Co.

Q. 124. Can you state whether this welder was also taken over by the Peerless Electric Co.?

A. It was moved with the rest of the machinery at the time the change was made.

Q. 125. When did you leave the employ of the Peerless Electric Co.

A. January 1st, 1905.

Q. 126. Was your employment with the Warren Electric & Specialty Co. and the Peerless Electric Co. continuous from January 1900 to January 1905?

A. It was not.

Q. To what extent was it not continuous?

A. During the dull season, some of the employees were allowed to take two weeks' vacation. At one time, for about a month, I was engaged in other work, but returned to the Peerless Electric Co. at the end of that time.

Q. 128. Did you, at any time after leaving the employ of the Peerless Electric Co., build an electric welder?

A. I did.

(All testimony as to the witness said after January 1st, 1905, is objected to as immaterial.)

Q. 129. Where, and about when did you build this welder?

A. At the Ohio Works of the Carnegie Steel Company at Youngstown, Ohio, between February and June, 1905, inclusive of the two months.

Q. 130. What were your duties at this latter place?

A. I was employed as an armature winder and transformer repair man.

Q. 131. I hand you a blue print marked for identification "Exhibit G," and ask you to state if you know what it represents.

A. It represents the welder which I built at the Ohio works of the Carnegie Steel Company in 1905, at the time it was first completed. It was later changed by fastening one of the movable

parts marked "A" to the base plate, and by the addition of a toggle and lever which was attached to the opposite part marked "A."

Q. 132. Was any welding done with the machine, as illustrated in this blue print?

A. Yes.

Q. 133. What kinds of welding?

A. It was used for welding pieces of half-inch rod together. Some welds were made in copper wires. It was used for welding together overlapping steel plates, and for welding together resistance ribbon.

Q. 134. What are the parts marked "D" in this blue print?

A. They represent the copper electrodes that were used in this welding.

Q. 135. What did these electrodes do in this welder?

A. By means of these electrodes pieces held between them were welded together. The ends of the resistance ribbon was overlapped between the points of the electrodes. They were then worked together by means of the levers marked "E", and the weld made by means of a switch, which turned the current on and off.

Q. 136. What kind of a weld did these electrodes "D" make?

A. They made a small circular weld about 3/16 of an inch in diameter.

Q. 137. How did the welds differ, if at all, from the welds shown in "Exhibit A," Smith's sample?

A. There was no difference, except that possibly the welds made by the machine which I built at the Ohio works of the Carnegie Steel Company were a little larger.

Q. 138. Where did you obtain the knowledge from which you were able to make your machine to weld in spots, as you have stated?

A. From work that I had seen done and had done, myself, on the machine made by F. P. McBerty at the Warren Electric & Specialty Company's factory.

Q. 139. Is this it, marked "Exhibit B"?

A. It is.

Q. 140. Did your machine make good or bad welds in spots?

A. It made good welds.

Q. 141. Is this machine now in existence?

A. I don't know. I understand that it was torn down sometime ago to secure the copper, which it contained, for use in the steel-making process at the plant of the Carnegie Steel Co.

Q. 142. Explain how the current flowed in Exhibit B, McBerty machine, when you used it for making welds in spots in January, 1901, if you knew, at that time?

A. As I understood it at that time, the current flowed through the pieces to be welded from one electrode to the other thus heating the pieces to be welded to the required heat. When this heat was obtained, pressure was applied to the levers, thus completing the weld.

Q. 143. Do you know Mr. Albertus C. Taylor, of Warren, Ohio?

A. I do.

Q. 144. Do you remember whether he was employed by the Warren Electric & Specialty Company, or the Peerless Electric Company, while you were employed with these companies?

A. He was employed by them at that time.

Q. 145. Do you know whether he saw this Exhibit B, McBerty machine, at one of these companies?

A. He did.

Q. 146. Do you know what company he is now connected with?

A. At the time I left home, about January 1st, this year, he was employed at the Winfield Company, Warren, Ohio.

Q. 147. Do you know whether the Winfield Company built and sold Commercial spot welding machines while Mr. Taylor was with them?

A. They did.

Q. 148. Do you know whether Mr. Taylor had anything to do with the designing or building of the spot welding machines of the Winfield Company?

A. It was common knowledge, and I have no reason to doubt it, that he was chief designer for the Winfield Company.

(Answer is objected to as guessing.)

Q. 149. Have you any interest whatever in any of the facts to which you have testified?

A. I have none.

Q. 150. Have you any interest whatever in the outcome or final result of this case, in which you have given your deposition?

A. I have not.

Direct examination closed.

Cross-examination by MR. STACKPOLE:

X-Q. 151. Where were you employed before you entered the employ of the Warren Electric & Specialty Co.?

A. I was employed at the Western Reserve Pottery Company, Warren, Ohio.

X-Q. 152. In what capacity?

A. As a steam engineer.

X-Q. 153. For what period?

A. About six months.

X-Q. 154. Before that where were you employed?

A. I was collector for the Milldale Jersey Farm, their business being located in Pittsburgh, Pa.

X-Q. 155. When you entered the employ of the Warren Elec-

tric & Specialty Co. had you had any previous experience in electric welding?

A. None at all.

X-Q. 156. After you left the employ of the Peerless Company, by whom were you employed?

A. By the Carnegie Steel Co., Youngstown, Ohio.

X-Q. 157. For what period of time, and in what capacity?

A. I was employed there from about the middle of January, 1905, until about the last of October, 1907. I was employed there in the beginning as an armature winder and transformer repair man, and later as sub-foreman in charge of the electric repair shop.

X-Q. 158. After that by whom were you employed?

A. By the Indiana Steel Co., Gary, Indiana.

X-Q. 159. For how long and in what capacity?

A. For about two years, as foreman of the electrical repair shop.

X-Q. 160. And after that where were you employed, for how long, and in what capacity?

A. By the Peerless Electric Co., as foreman of their winding department. From about Sept., 1909, to December, 1911.

X-Q. 161. Is that the same Peerless Electric Co. as you have been already talking about?

A. It is.

X-Q. 162. While you were with the Peerless Company during this period did you see the "Exhibit B"?

A. I did not.

X-Q. 163. And after that where were you employed?

A. By the Carnegie Steel Co., Youngstown, Ohio, from January, 1912, to March, 1912, as armature winder.

X-Q. 164. Then after that where were you employed?

A. By the Virginian Electric & Machine Company, as foreman of their factory, from March 1st, 1911, to March 1, 1912.

X-Q. 165. After that where were you employed?

A. By the Carnegie Steel Co., Youngstown, Ohio. From March 1st, 1912, to August 1st, 1912, as armature winder.

X-Q. 166. Then after that?

A. By the DeForest Sheet & Tin Plate Co., Niles, Ohio, in charge of their power plant and armature winding, from August 3rd, 1912, to April 1st, 1917.

X-Q. 167. Then after that?

A. By the Welding Patents Investigating Committee, Canton, Ohio. From April 1st, until July 1st, 1917.

X-Q. 168. What was the nature of your employment by the Investigating Committee?

A. I was engaged by them in collecting evidence having to do with a patent on electric welding, in which they were interested.

X-Q. 169. Specifically, you were engaged by that Committee in looking up evidence concerning this McBerty machine, were you not?

A. Yes.

X-Q. 170. During 1917 you saw this McBerty machine at the plant of the National Electric Welder Company, at Warren, Ohio, did you?

A. I did.

X-Q. 171. It was there in charge of Mr. McBerty, was it not?

A. It was.

X-Q. 172. While it was there did you and Mr. McBerty test the machine and make experiments with it?

A. We did not.

X-Q. 173. Did not either of you test it?

A. We were both operating it.

X-Q. 174. For what purpose?

A. For the purpose of making spot welds.

X-Q. 175. On what articles?

A. On fan blades and spiders, on pieces of fan blade, and pieces of transformer iron.

X-Q. 176. Did the National Electric Welder Company sell the articles which you and Mr. McBerty spot-welded with this machine?

A. Not to my knowledge.

X-Q. 177. So your opreation was not for commercial purposes, was it?

A. I did not understand that it was.

X-Q. 178. But for the purposes of this case?

A. They were not made for the purposes of this case.

X-Q. 179. How do you draw that distinction?

A. This case was not started at that time.

X-Q. 180. When was this case started?

A. Just recently.

X-Q. 181. Mr. McBerty had reason to believe that a suit on the Harmatta patent would be started, did he not?

(Question objected to as immaterial what Mr. McBerty thought, and that it is obviously not within the knowledge of the witness.)

A. I do not know.

X-Q. 182. Is the Exhibit B, including the welding device and the transformer, in exactly the same condition it was in in January, 1901?

A. It is not.

X-Q. 183. What are the differences?

A. In 1901 the clamping device was mounted on a shop bench; the transformer being located beneath the bench; the foot-operated switch was located in a different position. It does not have the same lower levers which it had at that time.

X-Q. 184. Is the transformer, itself, the same?

A. The transformer is the same.

X-Q. 185. Is the transformer connected in the same way?

A. The secondary of the transformer is connected in the same way. The primary connections may not be the same.

X-Q. 186. How many turns are there in the primary of the transformer in each leg.

A. I do not know.

X-Q. 187. Do you know where this transformer came from?

A. I do not. It is the same type as those built by the Warren Electric & Specialty Company at that time.

X-Q. 188. When the transformer was used in the machine in January, 1901, did it have a casing on it?

A. It did not.

X-Q. 189. At the time this transformer was used in this way was the Warren Electric & Specialty Company making other transformers exactly like this one?

A. They were making other transformers, but I never saw another transformer exactly like this one.

X-Q. 190. What is peculiar about this transformer to distinguish it from the other one?

A. It has the primary winding placed next the core, while the regular type of transformer, built by the Warren Electric & Specialty Co., had the secondary winding placed next to the core.

X-Q. 191. Is the wire of the primary winding in this transformer square in cross-section or round?

A. I do not know.

X-Q. 192. Where did the primary current come from to this transformer in the Works of the Warren Electric & Specialty Co.?

A. From where it was generated in the power plant of the Warren Electric & Specialty Co.

X-Q. 193. What was the voltage of that current?

A. Do you mean by that the voltage of the current where it entered the transformer?

X-Q. 194. Yes, if you can give it.

A. I think it was 220 volts.

X-Q. 195. And about how many amperes?

A. I do not know.

X-Q. 196. What was this current used for in the factory?

A. It was used for lighting, testing incandescent lamps, and for electric welding.

X-Q. 197. When you had the McBerty machine at the plant of the National Electric Welder Company, were the clamps placed on a work bench?

A. No. They were placed as they are now located.

X-Q. 198. You mean that the entire machine was assembled in the framework as it now appears?

A. Yes.

X-Q. 199. Is the framework the same?

A. It is with the exception of that board in front. That may or may not have been on the frame at that time. (Witness referring to board above the foot switch.)

X-Q. 200. The bolts which fasten the clamps to the wooden crosspiece look new, and are not of the same size. Do you know the reason for this?

A. I do. When we removed the welder from the box, in which it was shipped from Warren to Canton, we found one of the bolts missing, which held one side of the base plate, to the cross piece of the frame. To prevent this piece from falling from the frame we inserted a temporary bolt, which was the smaller bolt.

X-Q. 201. The small bolt is the new one, is it?

A. It is.

X-Q. 202. The right sized bolt had been lost, as I understand it?

A. It was not in the machine when we removed it from the box.

X-Q. 203. Did this particular table top or cross piece, to which the clamps are now bolted, come to the National Electric Welder Company with the machine?

A. I do not know.

X-Q. 204. When the clamps came to the National Electric Welder Co. they were separate from one another, were they?

A. I do not know.

X-Q. 205. Then I understand that you fastened on the left hand clamp piece to the wooden cross piece by a new bolt this morning?

A. We did.

X-Q. 206. Did you see the machine in the condition in which it was received by the National Electric Welder Co.?

A. I did not.

X-Q. 207. Did you have anything to do with assembling the machine on the frame bench at the National Electric Welder Co.?

A. I did not.

X-Q. 208. When the machine was assembled at the works of the National Electric Welder Company, was the large red fiber piece, and the two smaller grey fiber pieces clamped between the clamps of the machine?

A. I don't know.

X-Q. 209. When the machine was in use at the Warren Electric & Specialty Company, were these three fiber pieces, the one red and the two grey, clamped between the clamps of the machine?

A. I do not know that they are the same pieces.

X-Q. 210. The ends of the clamps, which project into the cross piece, are now held together by a screw, are they not?

A. I don't see the screw. I don't know whether that's a screw or a bolt.

X-Q. 211. At any rate there is a hole in the depending flange of the left hand clamp and a screw threaded hole in the depending flange of the right hand clamp, the two holes being in line, and adapted to receive a screw. That is so, isn't it?

A. It is.

X-Q. 212. On the outside of the depending flange on the left hand side, I see very plainly the marks of a head of a screw or a washer. Do you see them?

A. I do. And I also notice that the hole is bushed with a mica bushing. And that the washer just mentioned evidently was made of mica.

X-Q. 213. For the purpose of insulating the screw from the hole in the left hand depending flange? That was the object of the mica?

A. Yes.

X-Q. 214. This would indicate, would it not, that at sometime, the two depending flanges were held together by a screw at their front ends, but that they were maintained electrically insulated from one another?

A. Yes.

X-Q. 215. When you worked on this machine at the National Electric Welder Company, was this screw in place?

A. Owing to the position of the clamping device on the bench at that time, I am not able to state.

X-Q. 216. I think you mistook my question and answered it with reference to the condition of the machine when it was on the bench at the Warren Electric & Specialty Co., did you not?

A. I did.

X-Q. 217. So the fact is that owing to the position of the device on the bench, when it was in use, at the Warren Electric & Specialty Company, you do not know whether the screw held the two clamps together at the front end, is that correct?

A. That is correct.

X-Q. 218. What was the position of the device on the bench at the Warren Electric & Specialty Company which would conceal the presence or absence of this screw?

A. The clamping device did not extend so far out past the edge of the bench at the Warren Electric & Specialty Company as it now does, as it is mounted.

X-Q. 219. From the looks of the depending flange on the right hand side of the right hand depending flange, there seems to be a distinct mark of some sort about an inch and a half from the outer end. Would you say that that mark indicated where the edge of the bench came to, so to conceal the screw?

A. There is such a mark on the flange, and it is possible that this marks about the location of the edge of the bench.

X-Q. 220. Does that agree about with your recollection of the matter?

A. It does.

X-Q. 221. Now, if these two depending flanges had been held together by a screw, there would have been an interposed piece of fiber to hold them apart, would there not?

(Objected to as merely calling for the opinion of the witness.)

A. Naturally some means would have to be provided for holding the clamps in position.

X-Q. 222. And separated from one another the proper distance?

A. Yes.

X-Q. 223. Do you recall the use of such a piece of fiber as I have just referred to, when the machine was in use, at the Warren Electric & Specialty Co.?

A. I do not.

X-Q. 224. I notice near the front end of the movable clamp what appears to be pieces of fiber inset, into the clamps. Are these pieces of fiber, or what are they?

A. They are pieces of fiber.

X-Q. 225. And what is their object?

A. Their object is to insulate the movable jaws in case they should accidentally be brought in contact while the current is on the transformer.

X-Q. 226. I notice on the rear ends of the movable clamps projecting pieces of wire. What are these for?

A. I understand you to refer to the quarter inch rods extending from the rear end of the movable jaws. The tension of a spring connected across the insulated ends of these rods tended to oppose the action of the levers on the front of the movable clamp, which ordinarily held the jaws apart, when the machine was not in operation.

X-Q. 227. As I understand you, this clamping device was mounted on the work bench at the Warren Electric & Specialty Company, exactly as it is mounted on this cross piece in this Exhibit B, except that the ends of the device stuck out when it was at the Warren Company, about an inch and a half from the side of the bench, instead of about five inches and three quarters, as is now the case in the exhibit. Is that correct?

A. As I remember the clamping device, it did not project as far over the edge of the bench at the Warren Electric & Specialty Company as it does, as now mounted, in Exhibit B.

X-Q. 228. It extends beyond the edge of the bench in Exhibit B about 5¾ inches, does it now?

A. It does.

X-Q. 229. This spring that pulls up the switch lever, in Exhibit B, seems to be a new spring. Do you know when this spring was put on this exhibit?

A. I do not. I think both the switch and spring are new.

X-Q. 230. By "new," do you mean put on since the machine was at the National Electric Welder Company?

A. By "new," I mean that it is not the original switch that was used on the machine at the Warren Electric & Specialty Company.

X-Q. 231. When the machine was at the Warren Electric & Specialty Company, did you operate it from time to time to make spot welds, as you have testified, up to the time when you left that company?

A. I did not.

X-Q. 232. When was the last time that you recall that you operated it for making spot welds?

A. After the Peerless Company took over the fan motor and transformer business of the Warren Electric & Specialty Co., the welder was moved with the rest of the machinery and placed in another part of the building from where I worked. I did not operate the welder after this change was made.

X-Q. 233. In what month of what year was that change made.

A. Owing to the fact that the employees continued working during the change, I can not state just when the change was made; but I think it was about the first of July, 1902.

X-Q. 234. Was it part of your employment to operate this welder, as a butt welder?

A. It was not.

X-Q. 235. Was it part of your employment to operate it as a spot welder?

A. It was not.

X-Q. 236. When you operated it, you were doing so because of your personal interest?

A. I was.

X-Q. 237. I notice in this Exhibit B two extra leads from the secondary terminals. What were these leads connected to?

A. I don't know.

X-Q. 238. Do you recall these two extra leads as having been on the machine when it was at the Warren Company?

A. I do.

X-Q. 239. Were they connected with anything at that time?

A. I never saw them connected with anything at that time.

X-Q. 240. I notice that in this Exhibit B, that the steel brackets which secure the top of the core of the transformer to the frame and their bolts, appear to be new. Do you agree with me in this?

A. Just what do you mean by "new."?

X-Q. 241. As if they had been applied to the machine within a year or two.

A. I think the bracket has been applied within that time.

X-Q. 242. Do the clamps, which hold the laminations of the core together appear to you to be equally new, as are the brackets?

A. They do.

X-Q. 243. Now what is the diameter of the copper rods now in the clamps of this Exhibit B?

A. I don't know. I would require a micrometer to obtain the exact size. I could make a guess almost as close as I could come with a rule.

X-Q. 244. They appear to me to be very close to 3/8 of an inch in diameter. Do you deny this?

A. I think they are less than 3/8 of an inch in diameter.

X-Q. 245. Are they over five-sixteenths?

A. I do not care to guess. If it is necessary to obtain the correct diameters, it can be done with a micrometer.

X-Q. 246. Well, make your best estimate now of the diameter of these copper rods, as you do not have a micrometer.

(Objected to by defendant's counsel, as stated, he does not care to hazard a guess; and that there is a perfectly fair means of obtaining the correct diameter.)

A. Well, I'll put it between certain limits. The diameter appears to be between a quarter of an inch and three-eighths of an inch.

X-Q. 247. Is that as near as you can measure it with the rule that I hand you, which is marked in sixteenths of an inch?

A. My reason for objecting to giving the measurements taken across the ends of the rods as the true diameter, is that they appear to be enlarged at the ends, which are very nearly 5/16 of an inch in diameter.

X-Q. 248. Do you find between each pair of clamps a strip of copper, together with the copper rods?

A. There are strips of what appear to be copper between the clamps together with the copper rods.

X-Q. 249. Will you measure as accurately as you can with this rule the distance between the stationary jaw and the movable jaw on the clamps of the machine? And, if so, state what you find the distances to be.

A. Nearly three-eighths of an inch.

X-Q. 250. On the right hand clamp, the cam the lever is stamped with the figure 3, on its upper side. Now, placing this lever in such position that its end is as close as possible to the movable jaw, do you find that it touches the movable jaw?

A. I find that it does not.

X-Q. 251. How large in diameter were the guard rings that were welded on this machine?

A. There were two kinds of guard rings. That is, there were two kinds of the large guard rings, one being square and the other round. For the purpose of holding these, different shaped jaws were made purposely for each kind. These rings were about ¼ inch in diameter, that is the stock was quarter inch steel, for both the round and square rings.

X-Q. 252. Were the holding faces of the jaws for these rings curved?

A. They were.

X-Q. 253. In changing the machine to adapt it for spot welding, after it had been used for butt welding the curved rings, would you change the four jaws on the machine?

A. Yes.

X-Q. 254. And change the four jaws again when you went back to butt welding the ends of the rings? Is that so?

A. Yes. A pair of jaws was provided for each kind and size of rings.

X-Q. 255. Before you welded the ends of the fan guard rings, at the Warren Electric & Specialty Co., how were the ends of the rings joined together?

A. They were joined by means of one end of the ring being grooved, and on the other end a tongue was made to fit the groove. There were drilled and pinned. In some cases both ends were grooved. A thin piece of brass was inserted on both ends, and after they were brought together, they were pinned in place.

X-Q. 256. Do you know the source from which Mr. McBerty got his ideas for making this welding machine, Exhibit B, for welding ends of the fan guard rings?

A. I do not.

X-Q. 257. Don't you know that the ideas came from Mr. Craft?

A. I do not.

X-Q. 258. Don't you know that Mr. Craft visited the Pneumatic Wheel Co., at Freehold, N. J., and saw an electric welder there, and came back and told Mr. McBerty about it?

A. No, sir.

X-Q. 259. Have you ever seen a copy of an affidavit made by Mr. McBerty, which had the caption of the suit of the Thomson Electric Welding Company vs. Barney & Berry?

(Question is objected to because if such a thing is in existence it should be shown to the witness.)

A. I do not remember seeing such an affidavit, or copy.

X-Q. 260. Where were you during the year 1913?

A. I was employed at the plant of the DeForest Sheet & Tin Plate Co., Niles, Ohio.

X-Q. 261. Did you see Mr. McBerty during that year or have any communication with him?

A. I don't remember having any communication with him during that year, but may have seen him during that time.

X-Q. 262. Were you living at Warren during that time?

A. I was.

X-Q. 263. Do you know where Mr. McBerty was during that time?

A. He was living in Warren during that time.

X-Q. 264. Were you on good terms with him during that time?

A. Yes.

X-Q. 265. Did you ever meet a Mr. Thomas Howe, who was investigating the history of this McBerty machine?

A. Not that I recall now.

X-Q. 266. You have looked up other persons, who have had knowledge of this McBerty machine in the interests of the Welding Patents Investigating Committee?

A. I have.

X-Q. 267. And you have talked with them about the history of the machine?

A. I have.

X-Q. 268. Who were those persons?

A. Clyde Storier, John Gilder, Harvey Eckenrode, J. S. Powers, E. C. Lipps, Clyde Campbell, George Spade, Charles Wolf, Curtis Brewer. There may have been others. James Blott. I think that's all. All I can think of now.

X-Q. 269. You did this work in 1917?

A. Yes.

Adjourned at 5:39 P. M. until 9 A. M. Saturday, April 20, 1918.

Canton, Ohio, April 20, 1918.

9:25 A. M.

Met pursuant to adjournment.

Present, same parties as yesterday.

X-Q. 270. So far as you know, has the transformer now in the McBerty machine, Exhibit B, ever been removed and another transformer substituted to be used with the clamping device now associated with the present transformer?

A. Not so far as I know.

X-Q. 271. You notice in the transformer of this machine a number of taps or leads coming from the primary of the transformer, and that these taps are marked with little metal tags, indicating the voltage of the taps. That is so, is it not?

A. I notice the taps mentioned, but do not think that they indicate the voltage applied to these taps.

X-Q. These tags are marked respectively, 2V, 3V, 3.5V, 4V, 4.5V, are they not?

A. They are.

X-Q. And there is another tag marked Zero?

A. Yes.

X-Q. 274. Do not these tags indicate the voltage obtained from the secondary, when the primary line wire is connected to these taps at the points indicated by the tags?

A. I believe they do, provided that the proper voltage is applied at these primary taps.

X-Q. 275. What is the proper voltage?

A. I believe it to be 220 volts.

X-Q. 276. What are the reasons for this belief of yours?

A. Because as I believe that was the voltage used in the welder at the factory of the Warren Electric & Specialty Co.

X-Q. 277. In the machine, as it now stands, what is the tap marked, to which the primary line wire is connected?

A. To what do you refer as the primary line wire?

X-Q. 278. I mean the long wire connected to the taps at the back of the transformer, that has a free end, and is about eighteen inches long.

A. It is marked 2V.

X-Q. 279. Would that indicate that if the machine were used as it is now connected up, and assuming that the wire referred to is the line wire, and that the wire to one of the switch terminals is the other line wire, that the voltage across the terminals of the transformer would be two volts?

A. As the machine stands, it is not connected up to anything, but if it was connected, as assumed, in this question, to a line of the proper voltage, the tag would, I believe, indicate the voltage across the secondary terminals, that is, two volts.

X-Q. 280. What was the voltage across the secondary terminals of this machine as you used it at the Warren Electric & Specialty Co.?

A. I do not know.

X-Q. 281. Was the machine used with the same voltage across the secondary terminals for both butt welding and spot welding?

A. So far as I know, there was no change in the voltage across the secondary terminals for either kind of welding.

X-Q. 282. What was the voltage across the secondary terminals of this machine, when you operated it last year at the works of the National Electric Welder Co.?

A. I do not know.

X-Q. 283. What is the kilowatt capacity of the transformer in this machine?

A. I do not know.

X-Q. 284. As an electrical engineer can't you answer this question?

A. I can not.

X-Q. 285. Assuming that the machine is operating with the primary current of 220 volts, and a voltage across the terminals of the secondary is two volts, what was the amperage of the currents delivered by the secondary for the welding operation?

(Question objected to because based on an hypothesis.)

A. I do not know.

X-Q. 286. Does not your experience as an electrical engineer enable you to answer the last question?

A. It does not.

X-Q. 287. I notice in this machine Exhibit B, a vertical groove in each of the opposing faces of the stationary clamps just under the electrodes now present in the machine. When did you first notice these vertical grooves?

A. I do not have any recollection of noticing those grooves previous to this time.

X-Q. 288. Do you know the purpose of these grooves?

A. I do not.

X-Q. 289. I notice in each of the lateral parts of the stationary clamps tap holes on the under side about an inch and a quarter

from the front of the clamps. When did you first notice these tap holes?

A. I never noticed them until they were called to my attention just now.

X-Q. 290. Can you say what is the purpose of these tap holes?

A. I can not.

X-Q. 291. Do you know where the jaws are that were used for butt welding the rings in this machine?

A. I do not.

X-Q. 292. When the machine was used for butt welding the rings, how was a ring placed, forward or backwards or vertical?

A. The large rings were placed backward, as I understand the meaning of this question; and some of the smaller rings were welded in a vertical position.

X-Q. 293. How wide or thick is the piece of red fiber now present between the stationary clamps of this machine?

A. About one-half inch.

X-Q. 294. How wide is each of the pieces of grey fiber between the clamps of the machine?

A. About one-eighth inch.

X-Q. 295. How long is the top side of these pieces of fiber?

A. About two and a half inches.

X-Q. 296. Please measure, as best you can, with a steel tape the distance along the conductor from the face of the stationary jaw to the middle of the strap connecting the two sides of the transformer, at its bottom. I mean the conductor strap, connecting the two sides of the transformer secondary.

A. It is about thirty-six inches.

X-Q. What is the distance between the terminals of the transformer secondary?

A. At the point near the secondary coil the distance is about five and a quarter inches.

X-Q. 298. Please measure the circumference of the secondary conductor, which is composed of strands.

A. About one and seven-eights inches.

X-Q. 299. What would be the size of a spot weld made by the electrodes now in the machine?

A. Because of the fact that the electrodes now in the machine have blunt points, it is impossible to state the diameter of the welds that would be made by them.

X-Q. 300. The operating end of one electrode is not cut down at all, is it?

A. It is not.

X-Q. 301. And the operating end of the other electrode is very roughly tapered, is it?

A. It is.

X-Q. 302. Can you say by looking at these electrodes whether they have been used for welding or not?

A. As they are positioned in the machine it is impossible to see

the ends clearly. Therefore, I am not able to say whether these electrodes have ever been used for welding.

X-Q. 303. Is there anything about the transformer in this machine to indicate that it has ever been overheated?

A. There is.

X-Q. 304. What is that?

A. The secondary leads. The secondary leads have the insulation burned for over half their length.

X-Q. 305. Anything else?

A. The insulation at the top of the primary coil shows that the transformer has been quite hot.

X-Q. 306. In your direct examination you referred to the fan manufacturing season at the Warren Electric & Specialty Co. In what month of the year did that season begin?

A. It varied somewhat, but as a general thing, began about the first of November.

X-Q. 307. That is, began the first of November, to manufacture fans for the sale in the succeeding year. Is that right?

A. It is.

X-Q. 308. Is that true of the manufacturing season which we have called that of 1901?

A. It may have been later than that.

X-Q. 309. How much later?

A. Owing to the fact that all the material which went to make up a complete fan could not always be obtained in time to begin the season, as early as desired, it was sometimes necessary to use up what material was on hand, and to wait until that necessary to complete the fans had arrived. Therefore, parts of the fans were made up and held in the factory waiting until the material to complete them would arrive. In this particular season, owing to the fact that they were developing a new type of fan, this fan was not completely finished until after the first of the year 1901.

X-Q. 310. What do you mean by "finished"?

A. By a "finished" fan, I mean one completed and ready for shipment.

X-Q. 311. Can you say when the 1901 fan manufacturing season did actually begin?

A. I can not.

X-Q. 312. Can you say that it was before January 1st, 1901?

A. I can.

X-Q. 313. In preparation for the manufacture of these cheap fans, were the spiders and fan blades punched with holes for the rivets by which these parts were secured together?

A. They were.

X-Q. 314. How long did the fan manufacturing season of 1901 last?

A. In general, the manufacturing season lasted until about the first of July of each year. As far as I can recall, this was true of the 1901 fan season.

X-Q. 315. In the 1901 season, when were the first fans shipped?

A. I do not know.

X-Q. 316. What is your best recollection?

A. I have no recollection in regard to it, because the shipping was done in another part of the works, which I visited very seldom.

X-Q. 317. When were the first of the "cheap fans" finished in the season of 1901?

A. In February or March of that year.

X-Q. 318. About how many "cheap fans" were made in the 1901 season?

A. I do not know.

X-Q. 319. What is your best estimate?

A. I am not able to make any estimate as to the number of these fans that were completed. I believe, however, that most of the desk fans manufactured during that season were of the "cheap fan" type.

X-Q. 320. Were there over a thousand such fans made in 1901?

A. I think so.

X-Q. 321. Were there over two thousand of such fans made in 1901?

A. I think it is very likely.

X-Q. 322. As many as twenty-five hundred?

A. I think there was over three thousand made during that season, but perhaps not over four thousand.

X-Q. 323. There were two butt welds made for each fan of this type, were there?

A. There were.

X-Q. 324. In making these butt welds, were the ends of the rings tapered at all?

A. They were not.

X-Q. 325. In your answer to Q. 60, you refer to the use of this McBerty machine, by "the regular operator." Who was he in 1901?

A. By "the regular operator" I meant the man whose duty it was to operate this machine. As I remember it, three men operated this machine during the season of 1901. They were John Gilder, Curtis Brewer, and Charles Colliss.

X-Q. 326. Who operated the machine in 1902?

A. I believe it was operated by the same men who operated it in 1901.

X-Q. 327. Who operated it in 1903?

A. I do not know.

X-Q. 328. Who operated it in 1904?

A. I do not know.

X-Q. 329. These regular operators made butt welds on the machine, did they, to make the rings of the fan guards?

A. They did.

X-Q. 330. There were two such rings in each fan, were they?

A. Yes.

X-Q. 331. What persons did you see using the machine welding blades to the spiders of fans?

A. F. P. McBerty, and E. C. Lipps.

X-Q. 332. Anyone else?

A. Not that I remember of.

X-Q. 333. What was Lipps' job, in 1901?

A. He was employed in charge of the Filament making Department of the Warren Electric & Specialty Co., and also put in a part of his time assisting Mr. McBerty.

X-Q. 334. Do you think that McBerty and Lipps would know more or as much as you, yourself, know about the use of this machine for spot welding?

(Objected to because it is calling for the opinion of the witness as to what others know.)

A. I do not know.

X-Q. 335. When did you see McBerty and Lipps doing this spot welding work? I mean in what years.

A. In the year 1901.

X-Q. 336. Did you see them doing it in 1902?

A. I did not.

X-Q. 337. In what months in 1901 did you see them doing it?

A. In the latter part of January or in February of that year.

X-Q. 338. Any other months in that year?

A. No, sir.

X-Q. 339. Was the machine under Mr. McBerty's control?

A. It was, at that time.

X-Q. 340. Did you save any of the samples of spot welding that you made on this machine in 1901, or thereabouts?

A. I did not.

X-Q. 341. Did you ever see this machine operated at the Warren Electric & Specialty Company with electrodes that were not straight, but were bent up, and then bent again to bring their ends opposite to one another?

A. I never saw it used with such electrodes as those mentioned in the question.

X-Q. 342. Did you ever hear of it being so used?

A. I do not remember of hearing it being so used.

X-Q. 343. In your answer to Q. 67, you referred to Ed Craft, E. C. Lipps, Harvey Eckenrode, John Gilder, John McDonald, and Clyde Storier, as having manifested interest in this welder. What are the last addresses of these persons, known to you?

A. I do not know Ed Craft's address. The last I knew of E. C. Lipps he was in Detroit. I understood he was working for the Packard Co.; Harvey Eckenrode, Elyria, Ohio, Supt. of the Superior Metal Products, of Elyria, Ohio; John Gilder, Warren, Ohio, was employed at the Federal Machine & Welder Co.; John McDonald, Warren, Ohio, employed by the Trumbull Public Service

Co., Warren, Ohio; and Clyde Storier, Youngstown, Ohio, employed by the Miller-Smythe Co., Youngstown, Ohio.

X-Q. 344. What were the jobs of Craft, Eckenrode, Gilder, McDonald and Storier at the Warren Electric & Specialty Co. in 1901?

A. Ed Craft was electrician; John Gilder was a workman in the factory; John McDonald was, at that time, in charge of fan testing; and I believe, also, in charge of the assembling of the fans; Clyde Storier was a workman in the factory.

X-Q. 345. Now, referring to your use of this McBerty machine in 1901, how long did you keep the current on when you made a weld?

A. I should think about three seconds; perhaps a little longer.

X-Q. 346. With what diameter of stock?

A. Quarter inch stock. In the neighborhood of quarter inch. I don't know exactly.

X-Q. 347. Round or square.

A. Both round and square.

X-Q. 348. How long would you keep the current on in making a spot weld?

A. The time varied with the thickness of the pieces and the diameter of the points. The thin pieces, which I welded, could be welded in about one second, or less.

The thicker pieces, such as fan blades, took from two to five seconds. A small point would make a weld quicker than a larger one; that is, a weld one-eighth inch in diameter could be made quicker in the same thickness of material than one three-sixteenths of an inch in diameter.

X-Q. 349. What did you have to do in getting up or preparing either the 1900 catalog, "Exhibit one," or the 1901 catalog, "EXHIBIT two?"

A. Nothing.

X-Q. 350. What did you do towards procuring those catalogs to be used in this case?

A. Nothing.

X-Q. 351. Was there a fan catalog of the Warren Electric & Specialty Company or of the Peerless Electric Company for the season of 1902?

A. There was.

X-Q. 352. Was there any for 1903, 1904 and 1905?

A. I do not know.

X-Q. 353. Were the cuts appearing in the 1901 catalog on page 17 reproduced in the 1902 catalog?

A. I do not know.

X-Q. 354. Now, when were the exhibit photographs of the McBerty machine "C, D and E," made?

A. I do not know.

X-Q. 355. Did you have anything to with making these photographs?

A. I did not.

X-Q. 356. They show the machine in its present condition, do they not, with the exception of the character of the electrodes, and the work?

A. Photographs "C and D" show the machine in its present condition, with the exception of the electrodes, as mentioned, and of the position of the operating levers. "Exhibit E" shows the machine in this condition without holding anything between the electrodes.

X-Q. 357. The photographs, Exhibits C, D and E, show the machine in the present framework, do they?

A. They do.

X-Q. 358. After you left the employ of the Peerless Company in January, 1905, until you saw the McBerty machine, after you entered the employ of the Welding Patents Investigating Committee, in April, 1917, had you seen this machine?

A. I had.

X-Q. 359. When?

A. In the latter part of March, 1917.

X-Q. 360. Where?

A. At the plant of the National Electric Welder Company.

X-Q. 361. Was the machine then mounted as it now is in Exhibit B?

A. It was.

X-Q. 362. When was the last time before January, 1905, that you saw this machine?

A. I do not remember seeing it after the fan motor and transformer business of the Warren Electric & Specialty Company was taken over by the Peerless Electric, about the first of July, 1902.

X-Q. 363. Did you ever see the clamping device of this machine, Exhibit B, fastened to or mounted upon a base of slate?

A. I do not remember seeing it mounted on a base of slate.

X-Q. 364. Did you ever see, at the National Electric Welder Company, or anywhere else, a base of slate on which you understood, that this clamping device had been mounted?

A. I never understood that the clamping device had been mounted on a slate base, and do not remember of seeing it.

X-Q. 365. Referring now to the samples, Exhibit A, what is the thickness of the thin sheet, and what is the thickness of the thicker sheet?

A. I can not say exactly, but I believe the thin sheet to be twenty-nine gage and the thicker pieces to be twenty-four gage.

X-Q. 366. What are the sizes of the weld in these samples?

A. In the samples of the thin sheet the welds are about one-eighth of an inch in diameter. In the thicker sheets, they appear to be slightly more than that.

X-Q. 367. In what month of 1917 did you make these particular samples?

A. In April.

X-Q. 368. Were they the first welding that you did on the machine at the National Electric Welder Company?

A. I do not know. I made several welds in different pieces at that time; and I am not able to state whether these samples were the first I welded or not.

X-Q. 369. How often did you operate the machine to make welds at the National Electric Welder Co.?

A. I suppose I made a dozen or more welds at that time.

X-Q. 370. How many welds did you see Mr. McBerty make at the National Electric Welder Co. on this machine?

A. About the same number, I should think.

X-Q. 371. In making these welds did you use the cam levers to force the clamps toward one another?

A. I did.

X-Q. 372. These are new cam levers that are now on the machine, are they?

A. They are.

X-Q. 373. Did you use the switch that is now on the machine?

A. I did.

X-Q. 374. Was the machine, when you first saw it at the National Electric Welder Co. in the frame, as you now see it?

A. It was.

X-Q. 375. Were the steel spiders and blades of the cheap fan of the Warren Electric & Specialty Company japanned?

A. Some of them were.

X-Q. 376. Were most of them?

A. I do not know.

X-Q. 377. What was the kilowatt capacity of the transformer which you had built for the welding machine for the Carnegie Steel Company at their Ohio works?

A. I used a core of a five kilowatt Westinghouse transformer, but the welder was capable of a greater output than five kilowatts.

X-Q. 378. Was the line voltage delivered to this transformer?

A. Two hundred and fifty volts, approximately. The voltage varied there to a considerable extent.

X-Q. 379. What was the maximum amperage capable of being delivered by the secondary of this transformer?

A. I do not know.

X-Q. 380. Now.

Adjourned at 11:50 until 1:00 o'clock P. M.

Cross-examination closed.

Redirect Examination by MR. PATTISON.

Re-D. Q. 380. You have already stated that the "cheap fan" is represented on page 17 of the Warren Electric & Specialty Co.'s catalog for the year 1901. Please state which cut on this page of

the catalog shows the size and type of fan, the blades of which you saw spot welded in January, 1901.

A. The larger cut on page 17, over the letter "G," figure "2," show the fan to which I have referred to as the "cheap fan."

Re-D. Q. 381. And does this cut represent the fan made by the Warren Electric & Specialty Co. in which some of the blades were spot welded in January, 1901?

(Objected to as leading.)

A. It does.

Re-D. Q. 382. How are the blades represented in this cut attached to the spider?

(Objected to as incompetent.)

A. They are welded to the spider.

Re-D. Q. 383. In what way?

A. In spots.

Re-D. Q. 384. Was Exhibit B, the McBerty welder, the only electric welder at the Warren Electric & Specialty Co. while you were there?

A. It was.

Re-D. Q. 385. I call your attention to answer to X-Q. 185, and ask you to explain what you mean by the expression: "The primary connections may not be the same?"

A. By that, I mean that the wire which is at present connected to one of the jaws of the switch may not have been the same primary wire which had been connected to it in January, 1901.

Re-D. Q. 386. Do you know whether the primary connections, as connected in this Exhibit B, are connected as they were in this machine January, 1901?

A. I do not.

Re-D. Q. 387. What is the function in this Exhibit B of the bracket at the upper end of the transformer?

A. Do you refer to the steel bracket at the top?

Re-D. Q. 388. Yes.

A. It is to support the transformer in the frame.

Re-D. Q. 389. Does it have anything to do with the operation of the welder?

A. It does not.

Re-D. Q. 390. You have stated that the clamps at the ends of the transformer core appear to have been put there within the last year or two. Do you remember whether this transformer had similar clamps, when you operated the machine in January, 1901?

(Objected to as leading.)

A. It had similar clamps at that time.

Re-D. Q. 391. X-Q. 250 pointed out to you that the upper lever with the figure 3 on it on the right hand clamp, as facing the machine, did not engage the adjustable clamping jaw. Are you

able to say whether this lever was in its proper place on the machine when that question was asked you?

A. It was not in its proper place. It should have been on the opposite side, as shown by the figure 3 on the lever and on the top of the jaw on the left side of the clamping device.

Re-D. Q. 393. Please state whether in this Exhibit B, with the lever marked with the figure 3, co-operating with the adjustable jaw, figure 3, said lever operatively engages the jaw.

A. It does.

Re-D. Q. 394. Please state whether in this Exhibit B, with the lever having the figure 2 on it, on the right hand side of the clamping device properly and operatively engages the other adjustable jaw.

A. It does.

Re-D. Q. 395. Now, please explain the proper positions on the machine for these two levers, one of which has the figure 3 and the other the figure 2.

A. The lever having the figure 3 should be on the left side clamping device, on the jaw of which is also a figure 3. The lever marked with the figure 2 should be on the right hand clamping device.

Re-D. Q. 396. With these levers in this position, do you move them towards each other or away from each other to cause their cam surfaces to engage the adjustable jaws?

A. I move them away from each other.

Re-D. Q. 397. With this machine, Exhibit B, are these levers fastened on their pivots?

A. They are not.

Re-D. Q. 398. State whether or not they can be readily lifted from and placed on their pivots.

A. They can be.

Re-D. Q. 399. Please state whether or not this construction of the Exhibit B is the same as it was when you operated it in January, 1901.

A. It is the same.

Re-D. Q. 400. On the cross-examination you stated that this Exhibit B in 1901 had several different forms of clamping jaws, some for the butt welding of the guard rings, and some for clamping the electrodes for spot welding. Do you recall whether you removed any of these forms of jaws, and placed the proper jaws on the machine, when you used in January, 1901, for spot welding?

A. I do.

Re-D. Q. 401. You have been asked on your cross-examination several questions, which pointed out tags attached to wires running to the transformer, and based upon the indications on these tags, you were asked several questions. State whether your answers to such questions was based upon an assumption that the tags were correct, or were they based upon your personal knowledge that they were correct?

A. They were based upon the assumption that the tags were properly placed.

Re-D. Q. 402. As a matter of fact, do you know whether or not the tags are properly placed?

A. I do not.

Re-D. Q. 403. Referring to Exhibit A, Smith's samples of welding, of what is the thin sheet metal sample made?

A. It is made of sheet metal steel used in the construction of transformer cords.

Re-D. Q. 404. How about the sample of the relatively thicker sheet metal?

A. They are pieces of scrap fan blades.

Re-D. Q. 405. Referring to X-Qs. 277 to 279, which refer to the 18 inch long wire, connected to the tap at the back of the transformer, can you state whether this wire was connected to the machine in January, 1901, as shown in this Exhibit B?

A. I can not.

Recross-Examination.

Re-X. Q. 406. When this machine, Exhibit B, was produced yesterday, the cam lever marked 3 was on the right hand clamp, was it not?

A. It was.

Re-redirect-Examination.

Re-re-D. Q. 407. When this Exhibit B was unpacked yesterday morning were the levers in position on the machine?

A. They were not. I placed them on the machine itself, without any reference to their correct positions on the welder.

Re-recross-Examination.

Re-re-X. Q. 408. Who fastened the electrodes between the clamp jaws of this machine?

A. I do not know. They were there when I opened it up and took it out of the box.

Deposition closed.

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Deponent.

(By Mr. Pattison: The Notary and the witness are requested to initial the exhibits that have been marked for identification.)

UNITED STATES DISTRICT COURT,

EASTERN DISTRICT OF MICHIGAN,

SOUTHERN DIVISION.

HARMATTA PATENT NO. 1,046,066—IN EQUITY.

THOMPSON SPOT WELDER COMPANY, PLAINTIFF,

vs

FORD MOTOR COMPANY, DEFENDANT.

Deposition of Elihu Thomson, taken in behalf of the defendant, at the office of Messrs. Fish, Richardson & Neave, No. 84 State Street, Boston, Massachusetts, on the 1st day of July, 1918, before George C. Arvedson, a notary public in and for the County of Suffolk and Commonwealth of Massachusetts, pursuant to the annexed notice.

Present: J. L. Stackpole, Esq., in behalf of Plaintiff. Melville Church, Esq., of Defendant.

ELIHU THOMSON.

ELIHU THOMSON, a witness produced in behalf of defendant, having been duly sworn, deposes and says, in answer to questions propounded to him by Mr. Church, counsel for the defendant, as follows:

Question 1. Please state your name, age, residence and occupation.

Answer. Elihu Thomson; 65; Swampscott, Mass.; Engineer.

Q. 2. You appear here, do you not, in response to a subpoena as a witness in behalf of the defendant?

A. I do.

Q. 3. You are the Elihu Thomson, the patentee of U. S. Patents Nos. 347,140, 347,141, 396,015, 444,928, and 496,019, copies of which I now show you, are you not?

A. I am.

Q. 4. All of said patents and many more relating to the art of electric welding were assigned by you to the Thomson Electric Welding Co., a Maine corporation, were they not?

A. Yes.

Q. 5. When approximately was that company incorporated?

A. Don't remember exactly, but I think about 1888.

Q. 6. Were you an officer or director of that company?

A. Can't say.

Q. 7. What was your connection with that company, if you remember?

A. I had no definite connection so far as I remember. My work has been almost wholly with the General Electric Company in other lines, such as electric lighting, motors, electric railroads, and innumerable other branches of electrical application. The welding matter was somewhat of a side affair, and while I may have been a director of the Thomson Electric Welding Company for a time in those early days, I had no contract with it, I received no retainers from it; subsequent inventions to the original invention were given freely without compensation, as has been the case ever since. Even at the present time I have no very different status in connection with the present enterprises with which my name is connected; I refer to the Thomson Electric Welding Co. and the Thomson Spot Welder Co., of each of which companies I am Vice-President and Director, but rarely have anything to do.

Q. 8. Were you ever a stockholder in the Thomson Electric Welding Co.?

A. Yes, I have been and am a stockholder.

Q. 9. Are you a stockholder now in the plaintiff company, The Thomson Spot Welder Co.?

A. I do not think I have any stock separately from that of the Thomson Electric Welding Co.

Q. 10. Are we to understand, then, that your present connection and interest in Thomson Spot Welder Co. is of the same nature that it has been with the Electric Welder Co. and Thomson Electric Welding Co.?

A. The companies, as I understand, are Thomson Electric Welding Co., the name of the original company; and the Thomson Spot Welder Co., of much later date of organization, the original company being the Thomson Electric Welding Co., organized under the laws of the State of Maine and subsequently transferred to Massachusetts. I have no other connection than what I have stated in answer to Q. 7, with either of these companies. I don't recognize the existence of the Electric Welder Co. as such.

Q. 11. The fact is, however, that your present connection with the Thomson Spot Welder Co. is of the same nature as your connection with the old Thomson Electric Welding Co.?

A. I am a stockholder in one and not in the other, so far as I know; otherwise your statement is correct.

Q. 12. You have taken out at least from 30 to 40 United States patents on improvements in electric welding, all of which have been assigned either to Thomson Electric Welding Co. or Electric Welder Co., or Thomson Spot Welder Co., have they not?

A. Yes, I think that is correct, with emphasis, perhaps, on Thomson Electric Welding Co.

Q. 13. Have you now any connection as expert, engineer or consulting engineer, with the plaintiff company, Thomson Spot Welder Co.?

A. No, except what is entirely voluntary on my part without any retainer or compensation.

Q. 14. Were you present at the trial of the suit brought by Thomson Electric Welding Co. and others against Barney & Berry, Inc., in the U. S. District Court for the District of Massachusetts several years ago, on the Harmatta patent No. 1,046,066 here in suit?

A. Yes, I was present at the request of Mr. F. P. Fish.

Q. 15. Were you examined as a witness for either party at that trial?

A. No.

Q. 16. When did you begin your investigation of the subject of electric welding?

A. That is old past history. The first suggestions of it came to me about 1877. I had no chance to do anything about it till much later, however, but discussed its feasibiiity and practicability and the forms it would take about 1881 and thereafter until about 1885, when I began the construction of apparatus for welding.

Q. 17. Patent No. 347,140, of August 10, 1886, was the first patent issued to you relating to the art of electric welding, was it not?

A. The first in number; there were three issued together.

Q. 18. You are generally credited, are you not, with being the father of the practical electric welding art?

A. Yes, before the work represented by the original patents there was no such art.

Q. 19. Your patent No. 347,140 describes electric welding as applied to welding of the surfaces of metallic wires, bars, etc.; your patent No. 396,015 describes electric welding as applied to the welding of metallic rivets to metal pieces intended to be united by said rivets, as well as to the electric welding together of such riveted metal pieces themselves adjacent to the rivets; your patent No. 444,928 describes electric welding as applied to the welding of superposed strips, sheets, plates, bars, etc.; and your patent No. 496,019 describes electric welding as applied to the welding of tinned iron plates. Am I not right about this?

A. Not quite right. The statement is fairly correct if it be understood that, in regard to the patent 347,140, the metallic wires, bars, etc., also include objects which may be the subject of butt welding; in regard to patent 396,015, entitled The Method of Electric Riveting, the statement in the first instance is erroneous in not providing for the main object of the patent, which was the formation of rivets in place and the heading of rivets in place by electric heating and upsetting; incidentally to this it is shown that the rivets may be not only dealt with, as is ordinarily the case in riveting, but may be actually welded if desired to and with the body of the plates. The patent 444,928 does describe electric welding of the type of patent 347,140 as applied to the welding of strips by their edges or where they overlap on each; the statement in relation to patent 496,019, as applying to electric welding of tinned iron plates is incorrect, the title of the patent being "electric soldering" dependent on the fusion of the tin coating and not involving any deformation or plasticity

of the plates themselves. This process is not electric welding any more than the use of a soldering iron by a tinman is a welding process.

Q. 20. In all of these patented applications of your electric welding process referred to in my previous questions, as I understand the matter, a welding current is passed through the two metal parts proposed to be joined that are between two electrodes which concentrate the current at the place to be welded, this place being between the electrodes and at the meeting places of the metal parts, and the electrodes first press together the parts to be united to secure a good contact at the place to be welded, and at that place the resistance offered to the passage of the current by the joint between the parts creates such heat that the adjacent metal is fused or raised to a welding temperature and the continued pressure of the electrodes completes the union. Is my understanding correct?

A. I cannot adopt your verbiage in this connection. For example in butt welding, I don't see any electrodes which concentrate the currents at the place to be welded. The clamps are enormously large, and so far from concentrating the current they diffuse it until it reaches the bars which themselves concentrate it. It is the limited size of the bar which causes the concentration and the local heating thereof. Inasmuch as in butt welding the two parts are brought together at a sort of semi-break in the circuit, the greatest amount of this heating is where the bars meet, and the weld takes place there. Otherwise the statement is substantially correct.

Q. 21. In Fig. 13 of your patent 347,140, where there are shown a split ring R whose ends are to be united, and electrodes K K′ for clamping such ring ends and bringing them together with pressure and feeding current to them, is not the welding heat relied upon to affect the welding developed by the resistance offered by the passage of the current by the joint J between the ends of the ring?

A. Yes, but in the figure the ring is shown open with the ends not pushed up against each other which would not be the case in actual welding.

Q. 22. In your patent 396,015, you indicate in Figs. 9 and 10 a form of apparatus in which the electric welding current is intended and adapted to be passed not only through the rivet blank itself but also through the pieces or plates to be united; in such an apparatus would not only the rivet be softened and set but the pieces or plates themselves be welded together by the current?

A. I don't think that would happen. The patent says "by the use of this form of apparatus a heating electric current might be passed through the metal plates themselves at parts around the rivet by means of the pressure pieces or clamps K K′. Such current will assist in raising the portion of the plates immediately surrounding the rivet to the welding temperature." This means it would lessen the loss or escape of heat from the rivet itself. I continue the quotation: "but the prime object is that through the application of the pressure the plates themselves may be held together during the riveting. The blocks K′ K may therefore be faced with mica or

other insulator m m′." This means that it may be objectionable to have the current escape laterally and that it had better be concentrated on the rivet itself, while it is needed, however, that the plates themselves be held closely together so that a good job of riveting may be accomplished, or that no metal of the rivets should spread between the plates. The statement is an unimportant one and I have explained how it came to be there.

Q. 23. The portion of the specification which you have quoted is part of the description of the form of apparatus shown in Fig. 9 of the patent. In such apparatus pieces of mica or other insulation lettered m m′ are provided. Suppose those insulating pieces m m′ were omitted from that apparatus; would not the current pass through the plates or pieces P P′ from the electrodes K K′ as well as through the rivet blank?

A. No, not necessarily; that would depend on the pressure of the contact which would be very high in the case of rivet blanks and comparatively much less in the case of plates; in fact, if the plates were not cleaned the rivet blanks might possibly take all of the current. Thus in Fig. 10 the insulating mica pieces are not shown; it is not necessary. The pressure of the piece K^2 evidently is much less than the pressure of the plunger which it surrounds; and besides, the plunger has only a sliding fit which is not a good contact for carrying the welding current, a close, tight contact being needed. Then again, in case the pieces K K′ were made of copper and the plungers which head the rivet were not made of copper, no complete diversion of current could take place; and if the pieces K K′ were of iron, and the plungers which did the heading were of copper, only a moderate current would pass by the blocks K K′. So that the operator has in such a device the whole matter of distribution under his control according to the construction adopted.

Q. 24. I find on page 1 of this patent 396,015 this statement: (line 22) "The heating of the rivet when in position may be carried only to the point sufficient to permit it to be set by swaging or heading its ends, or the current may be allowed to pass for a longer period and until the central portion of the rivet, as well as the metal near thereto, is raised to a welding temperature, when the application of pressure expanding the rivet in its seat weld the same to the metal surrounding it, and the application of pressure to the pieces to be riveted will weld them together around the rivet. In some cases I may cause the electric current to flow across from piece to piece of the parts to be riveted as well as through the rivet itself." Does not this quotation indicate an intention to pass current, not only through the rivet but through the pieces themselves in some cases?

A. Yes; it can't be avoided in any case. As soon as the rivet head spreads over the plates the communication is made to the plates and they are involved in the passage of current. For, as is well known when two or more paths are open to a current, the current divides unless special insulating methods are employed to prevent; and moreover, as the body of the rivet is very much hotter than the

plates, the resistance of the plates for any length is very much less than in the rivet; so that an unavoidable shunting must take place.

Q. 25. And the result of that shunting of current through the plates will result in the welding of the plates themselves, will it not, as expressed in the portion of the specification to which I have directed your attention?

A. It might if sufficient in amount of diversion to the plates.

Q. 26. Is not the idea of welding the plates themselves together also given expression in the sixth claim of this patent, which reads as follows:

> ("The herein described method of fastening two pieces of metal together, consisting in passing a heating electric current through a rivet or rivet blank, passing through the pieces as well as through the pieces of metal themselves in the neighborhood of the rivet, and applying pressure to set the rivet and weld the pieces together.")

A. Undoubtedly that is one of the objects of the patent as clearly shown in Figs. 6 and 7, not only to heat the rivets, but in some cases to allow the current to heat the plates so that they might be involved with the rivet in a weld.

Q. 27. Did you ever, prior to the date of the application for this patent 396,015, attempt an application of your riveting process in which current was passed, not only through the rivet but through the pieces to be united also so as to weld the pieces together?

A. That is impossible to say now, whether such a thing was done just prior or just when, but I have made such rivets

Q. 28. In your patent 444,928, in describing the operation of the apparatus shown in Fig. 1, you say: (line 78, page 1)

> ("In this figure I have illustrated the application of my invention to the welding of the edges of two plates M M′ together, the plates being shown in end view as in position between the rolls ready to be fed between them in the longitudinal direction of such plates. The edges are slightly over-lapped, as shown, and the plates, being in position between the rolls, may be squeezed together by means of the screw S, thus forming an electric contact between them. The electric current being now turned on as it passes from one roller to the other and across the point of pressure will heat the work to the welding temperature and soften the same slightly, after which the screw may be driven a few more turns to effect a solid union. The work, having been thus started, may now be moved along through or between the rollers, so as to bring successive parts of the joint into position to be pressed and heated at the same time.")

What kind of a weld, if any, would be produced between the plates according to this described mode of operation before the movement of the plates through between the rolls began?

A. A corner weld, the beginning of the seam. The process is in extensive use.

Q. 29. How would that corner weld, as you call it, differ from a spot weld if the welding operation were carried no further—I mean if no attempt were made to weld a seam after the making of the corner weld.

A. It would involve the whole of the overlapping metal of the strips; the strips would be crushed down at that point and spread at the corner and the weld would not be technically like a spot weld, which involves the pressing down at a distinct spot, the localization of the heating by the current at that spot, and the support of the metal at the spot by the surrounding metal so that the surfaces in union are not spread out or extruded to any appreciable degree.

Q. 30. Would it be possible to perform spot welding, as you understand it, by the use of roller electrodes adjustable toward and from each other upon interposed metal plates?

A. Yes; just in the same sense that it would be possible to perform spot welding with the apparatus of say Fig. 1 of patent 347,141; but far more effectively could it be done with this last mentioned apparatus than with any roller scheme which would be wrong altogether. If the pieces W W' in the Fig. 1 referred to were solid bars of copper slightly tapering at the ends and they were separated, pieces of sheet metal interposed, overlapping, and the pressure was sufficient and the current sufficient, a real Harmatta spot weld might be made. Now roller contacts, unless they dig into the metal, are line contacts; a single line where the curve of the roller meets the flat of the metal, by no means so excellently adapted as the slight modification of the figure which I have referred to; the whole point of the matter is the conception of the Harmatta spot weld having existed or not having existed. The thing is a process and not an apparatus.

Q. 31. Could or could not spot welds be made today by means of an apparatus such as shown in your patent 444,928 where adjustable roller electrodes are disclosed?

A. It will be noted that in the patent referred to there are several figures. In Fig. 1 the rollers overlap the joint to be made very considerably up and down, so that the joint only occupies a small portion of the length of the roll. It is evident that this length of roll might be many times what it is in this figure and not change the relation of things as they are in that figure, so that the question does not really suit the case.

Further, turning to Fig. 4, the rolls are extended to contact the plates on each side to make an edge weld; and in Fig. 5 the rolls are divided and are different, top and bottom, the parts of contact not being even opposed to each other. So that I can see no particular reason why this device should be selected as an apparatus for producing spot welds any more than other figures I have pointed out, and no doubt I could point to many other figures in various patents which with equally slight modifications were well adapted to make spot welds.

Q. 32. With the roller electrode apparatus shown in Fig. 1 of your patent 444,928, would it not be possible to make spot welds on overlapped or superposed plates placed between the rollers—I mean not only one spot weld but a succession of them, with intervening areas of no weld?

A. The question seems to me rather incomplete because it does not state anything about the changes to be made in the disposition of the plates themselves with respect to the rollers. In Fig. 1 it will be noted that the weld to be made is very much narrower than the longitudinal extent of the roll, which, as pointed out before might be made of indefinite extent, without changing the operation for which they were intended. So that if I must assume in answering the question that the rolls are applied and are of such limited extent as to cover a portion only of the overlapped surfaces, it would be proper to answer the question yes; but, that such an apparatus would be by no means as good as the other devices which I pointed out in preceding answers. What in other words would be the object of the rollers which only give a line contact when, if you are making spot welds, you can have so much better a device without rolls? In other words, I regard the question itself as somewhat far-fetched.

Q. 33. You are willing to concede, however, that spot welding may be done by roller electrodes and that the mere fact that roller electrodes give a line impression does not operate to prevent them from producing spot welds?

A. The line impression doesn't help them in the least; it is a disadvantage; and while I might drive a nail with a heavy beer bottle, I prefer a hammer. The whole thing rests on the existence of the conception of a spot weld, and I see no reason for denying the fact that many pieces of apparatus may be so modified or so used as to produce an approximation to the spot weld and under limitations which I think I have made clear. I am willing to concede that a roller apparatus might be one of these various appliances. But, as I said before, I might take many patents showing many electric welding apparatus and point out modifications which would make it possible to make spot welds, and I can't see any particular reason why rollers should be preferred.

Q. 34. In the form of apparatus shown in Fig. 1 of your patent 444,928, only those parts of the surfaces of the rollers lying immediately back of the overlap or joint pass the welding current through the joint; am I not right about this?

A. Of course the contact, or the part where the rollers and metal press against each other, carry the current, and only those parts. I mean of course so far as the work pieces are concerned.

Q. 35. Isn't it true that only those parts of electrodes which lie immediately behind the contacting parts of the pieces to be united pass the current through the pieces to form the weld?

A. All the metal surrounding the contact contributes to the conduction because the current flows along and then in at the joint. It is much the same as if we put a hole in the bottom of a tank contain-

ing water; the flow of water will reach the hole, and not only goes straight down but along the bottom, the sides and in every way moves toward the outlet and the statement in the question would be true only of a very thin layer of the surface of the roll.

Q. 36. Isn't it true that only those parts of the surfaces of electrodes which lie immediately behind the contacting surfaces of the pieces to be united pass the current through the pieces to form the weld?

A. Yes, that is true; the current leaves the roll by those surfaces and enters by those surfaces.

Q. 37. Your company has manufactured and sold or leased for use electric welding apparatus employing roller electrodes, has it not?

A. I don't recall any cases especially.

Q. 38. You have seen such apparatus, haven't you?

A. Yes, I have seen it in use, and it has been experimented with to a considerable extent. As to the facts called for by the question I have no present information. I do know this, that there was a long period of years—just when the limits might be set I do not recollect—during which although efforts were made to introduce roller welding, there seemed to be no takers, so that the patent 444,928 may be said to have been lying without utilization.

Q. 39. But roller welding as a practical matter did arrive many years ago, did it not?

A. Well, there has been a form of roller welding which has been very extensively used. I refer to the making of seamless pipe, in which the edges of the skelp are progressively welded in passing between current carrying rolls, the edges being butted, not overlapped. In a sense the arrangement is akin to Fig. 4 in patent No. 444,928; that has been in extensive use in making pipes, tanks, etc.

Q. 40. In your answer to Q 29, you implied that in the making of the corner weld, as you have termed it, there would be extrusion of metal. What did you mean by that?

A. I meant the same action that occurs in butt welding—the spreading of the metal at the weld where it is so soft that unless there is resistance to lateral flow, it moves in the line of least resistance.

Q. 41. Are you prepared to say that there is no extrusion of metal at all, in the sense in which you have used that term, in the making of spot weld, so-called?

A. There is a slight movement of the metal but it is not manifested as an extrusion. The plates appear after the welding slightly indented or practically flat. The indentation, of course, means that the metal has moved, but practically all of the metal is included in the weld, framed around by the unwelded material which being on edge opposes a very high force in the spreading.

Q. 42. Is that true whether the plates being welded have both of them plane surfaces or one a plane surface and the other a small projection at the point where the welding takes place?

A. In what is known as projection welding, still another form of welding, the projection itself is crushed down, and in sheet metal the place of the projection is the place of the weld. If the projection is made, as is often done by punching or pressing one of the pieces so as to form a projection from the back, leaving a hollow back of projection, the welding tends to fill this hollow and flatten the whole thing. In this case, the extrusion, if such occur, is backward into the plane of the plate, mostly.

Q. 43. In projection welding where projections are formed on the plates otherwise than by punching from the rear of the plates, is there any extrusion of metal during the welding operation?

A. There is a spreading of the projection and an enlargement of the section of the weld; but the term "projection welding" has been used so loosely, to cover such a variety of cases, that I shall have to ask counsel to point out just what he means or I shall have to catalog the whole list of these forms.

Q. 44. In my last question I had in mind the welding of plates provided with projections such as shown in Figs. 3 and 4 of the Rietzel patent 928,701. With this limitation I ask you if there is what you call extrusion of metal in the welding together of such plates, according to the method of Rietzel.

A. Yes, there naturally would be extrusion as each one of the welds is plainly like a small butt weld, but I do not know that that method has been practiced in contradistinction to the other methods shown in the same patent, which have been extensively practiced.

Q. 45. Did you ever place or see placed superposed plates of metal between the roller electrodes of an electric welding machine and make or see made a weld by pressing the work between the electrodes and passing a welding current through the work while the pressure was continued; and if so, when first?

A. If the question means to inquire when I saw a roller welding machine for continuous seaming used without making a continuous seam, I would say I have never seen it. If it means with the making of a continuous seam, then I should like to be informed.

Q. 46. Does the question not describe the making of what you have characterized as a corner weld with a machine like that of your patent 444,928?

A. We never made corner welds except at the beginning of a seam, and then of course they were no longer corner welds but continuous with the seam. If counsel means to draw a line between a corner weld and that which follows it, I haven't any sympathy for the situation at all.

Q. 47. With apparatus such as shown and described in your patent No. 444,928, could you not fasten two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots?

A. Yes, just as I said it could be done better with many other devices which wouldn't have to be modified as much, all of which existed in the electric welding art many years ago.

Q. 48. Would not the product resulting from the practice of the method of use of the apparatus of your patent No. 444,928, set forth in the last question, exhibit an area of no weld around each of the welded spots?

A. Of course if an apparatus was modified to produce Harmatta spot welds it would produce them and they would have the characteristics of such welds. I have already made it clear that I do not consider that the particular apparatus as 444,928 is anywhere near as well adapted to produce Harmatta spot welds as much other apparatus forming the subject of other patents taken out at various times by myself and others. I am interested merely in having the plain truth of this matter understood, namely, that with any apparatus which produced Harmatta spot welds the products resulting would exhibit an area of no weld around each of the welded spots.

Q. 49. As I understand it, in the practice of the method of uniting tin plates by the use of the appliances shown in Figs. 4, 5 and 6 of your patent No. 496,019, the two parts or pieces P P′ to be united are pressed together flatwise by the electrodes C C′ and current is then passed through such parts until the tin coatings of their approximate surfaces are fused or welded by the heat generated between such surfaces. Is my understanding correct?

A. It is, except that we do not technically call such a joint a welded joint, since the complete liquefaction of the more fusible tin coating is the cause of the union.

Q. 50. The surfaces of the plates or parts united by heat and pressure according to the disclosure of Figs. 4, 5 and 6 of this patent 496,019 are surrounded by areas of no union, are they not?

A. As I have said the process is a soldering process, and of course if any parts are not soldered they are outside of the soldered area. Such pieces when stripped away from each other tear apart just as two soldered joints tear apart and the two original pieces are not joined in any sense by welding.

Q. 51. In the form of apparatus shown in Figs. 21 and 22 of your patent No. 496,019, the pieces to be united are represented as consisting of plates superposed flatwise and electrodes C C′, through which pressure and current are applied, are shown of as less facial area than the area of the superposed parts of plates, are they not?

A. Apparently so, but I would say for the benefit of counsel the letter P, meaning the work in all these cases, merely relates to pieces shown in Figs. 1, 2, 3, 4, 5, 6, etc., to avoid the necessity of drawing in details in such Figs. as 21 and 22. No importance is to be attached to this or the details of these figures. They are all solderings and there is no more reason for referring to these Figs. 21 and 22 than to Fig. 1 or Fig. 4.

Q. 52. The use of the apparatus shown in such Figs. 21 and 22 would result in the production of united superposed plates having an area of no union surrounding the area where union has been effected, would it not?

A. Yes, and if shellac had been used instead of tin to unite the pieces, the same would have been true, except that instead of calling it solder we should have then called it cement.

Q. 53. In the use of the apparatus shown in Figs. 21 and 22, of this patent 496,019, if sufficient current were employed, not only would the tin coating on the superposed metal plates be fused but the plates themselves would be fused or welded together, would they not, according to the laws of electric welding well known at the date of this patent, 496,019?

A. If the assumptions of the qestions were carried into practice, the pieces would be spoiled in that operation. The particular feature of this operation of electric soldering, is that the pieces themselves undergo no deformation of any kind. It is a pure gratuity to assume that such a thing as has been assumed is possible. I could read out of the patent many things which absolutely deny any such contemplation. I call attention to Figs. 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, as absolutely denying the situation which is supposed to be possible by the question with this arrangement. In Fig. 7 the electrode pieces are faced with carbon. Any very moderate current would heat this carbon to redness and cause its combustion long before the work could be brought to welding surfaces. Then look at the facets and cut faces of the electrodes in Figs. 8, 9, 10 and 11, and again notice the pin-like projection in Figs. 12 and 13; and further, the serrations in Figs. 14, 15, 16 and 17; and again the formation of the electrode surfaces in Figs. 18, 19 and 20. Such surfaces would of course break down under a heavy current and flatten right out. So that, there is no question in my mind that it is the merest gratuity to assume a condition for which this invention was never in the slightest degree intended—and having made the invention, I ought to know.

Q. 54. I shall have to ask you to answer my question.

A. Counsel has apparently forgotten that the patent to which he refers, No. 496,019 refers to a definite apparatus, absolutely incapable without extensive modifications of being used in any such way as he has assumed. Why not assume at once a Harmatta spot welding machine and have done with it? Why try to use a patent which has no relation whatever with welding and which certainly nothing to do with spot welding. It's a cementing machine requiring only very moderate currents and very moderate pressures and making only very moderate unions. For example, on page 2, line 4, in regard to the use of a flux:

> "Slightly oiling the cementing surfaces with lard oil or other stearine containing oil will easily suffice when the pieces P P' are tin plate."
>
> "My present invention relates to an improved method of producing soldered joints between metal pieces, and is particularly applicable to soldering sheet metal pieces flatwise. When applied to tin plate the tin itself which covers the iron plate is

often sufficient for the uniting solder. In other cases solder may be applied."

Besides these quotations tending to show what the patent is really for, I will also add this one which clinches the matter:

"My invention comprises further an improvement in electric soldering consisting essentially in establishing an electric resistance to the passage of the current from the clamp or pressure block back of the joint to the metal or the work to be joined. This may be done either by modifying the surface of the pressure block itself or by modifying the surface on which it bears, or both, or by the interposition of a thin septum, layer or zone of resisting material, or material modified in condition or form so as to oppose a resistance to the passage of an electric current. Some of these means for establishing a resistance are hereinafter more particularly described."

This last quotation calls attention to the fact that an electric resistance is established back of the joint to be made—that is, in the electrodes, stating the means to be used, having relation to such figures as I have referred to, 7 to 20. Now, inasmuch as tin melts very readily, it is perfectly safe to put resistance into the electrode faces to generate heat which never need be so high as to cause destruction or deterioration, inevitably the case if a very heavy current were used.

Q. 55. Will you now please give me, if possible, a relatively short and concise answer to my last question?

A. I will. The apparatus of Figs. 21 and 22 of patent 496,019 is no good for electric welding.

Q. 56. You still haven't answered my question.

A. I think I have. You have asked me about a particular apparatus and the use of it; you said actually "in the use of the apparatus shown in Figs. 21 and 22, of this patent 496,019, if sufficient current were employed," when the fact is that no sufficient current could be employed in that apparatus. If you were an electrician you would know it from the look of the apparatus. The apparatus would burn up; in fact I may add, that the arrangements for passing current and the volume of current are in no sense suggested for welding. That is the reason I have been unable to answer, as Counsel thinks I ought to have done, and that is the reason, too, that I have said the whole thing is a mere gratuity to make such an assumption.

Q. 57. At the date of this patent 496,019 was your knowledge of electric welding so limited that you did not know that plates of metal superposed flatwise could be welded together at their proximate faces by the pressure of current carrying electrodes?

A. Nobody ever suggested it; it was never discussed.

Q. 58. Do you wish to give the impression that you, the father of

the electric welding art, did not at the date of this patent 496,019, know that superposed flat plates could be thus welded by the pressure of current-carrying electrodes?

A. I suppose in answering the previous question that what is referred to is what is now known as the spot weld. I notice the question is really broader than that and perhaps I should not have answered it so briefly. I will say that while we knew that overlapped plates pressed between electrodes might be welded, it had never occurred to me nor to others with whom I was associated to make what are called spot welds, that is, local spots of welding by electrodes narrowed down at the ends and of high conductivity metal pressed towards each other with sheets overlapping between, localizing the work of the weld to only a portion of the immediate surfaces.

Q. 59. May I ask you to give a clean-cut definition of what you call spot welding?

A. I understand by a spot weld a weld applied to plates or more particularly to sheets of very moderate thickness possessing themselves a certain amount of flexibility, such weld being produced by pinching the parts of the sheets at a spot surrounded by metal not so pinched, passing a current of sufficient amount to suddenly heat the meeting sides of the sheets up to welding temperature, such current entering through the electrodes which are naturally of high conductivity metal at least through the most of their length and narrowing near the work to faces which constitute the area of the spot. On account of the cooling effect of the electrodes and of the surrounding metal about the spot, the highest temperature naturally is reached where the sheets come together; it is local to the meeting sides of the sheets, the pressure causing union or true welding, which may be defined as a true interlocking of the molecules when the metal is plastic. The cutting off of the current and the removal of the electrodes leaves a visible spot slightly depressed, it may be, and but little deformed externally for an ideal case. It will be evident that under the conditions the plastic metal, being as it were supported or framed in edgewise or laterally, cannot flow away.

Q. 60. How large may a spot weld be; how large a spot weld have you ever seen?

A. I have seen spot welds that were about an inch in diameter, the very largest. How large they may be is another question. I myself have a theory that if the scale of operations were multiplied by some factor in every way, we might have spot welds of very large size; I mean by this that given a certain size weld, a certain thickness of metal, a certain extent and overlap of sheets, and so on, we might use the factors for multiplication, say 100, and have a spot weld 100 times as big in every way. In other words, we might look at our small weld with a magnifier which magnifies it 100 times. As a matter of practice, however, we have no need to consider such magnification; the field is very definite and is gen-

erally limited to small thicknesses of sheet metal; and difficulties arise in larger work because all the conditions cannot be magnified by the same factor.

Q. 61. In your definition of spot welding what is the limit as to the thickness of the plates to be united? Must they necessarily be very thin or may they be thick and inflexible?

A. They should be flexible. Where they are thick they need enormous pressure to bend them to meet; but where they are too thick and not very true in surface they generally make contact at the wrong spot before the electrodes force down the metal at the contact; but that is a limitation of apparatus, probably. I have seen good spot welds not too near together on extended sheets up to 3/8 thickness, the spots themselves being probably 3/4 of an inch in diameter or more. Such work is difficult and the real practical work is with the thinner metal.

Q. 62. What is the greatest thickness of sheets you have seen spot-welded?

A. I have seen sample plates up to 1/2 in. or more, with an area of about an inch; but I have my doubts as to the entire practicability of such heavy work.

Q. 63. What extreme thinness of plates may be spot-welded?

A. I haven't tried, but I think there is scarcely any limit.

Q. 64. What is the extreme limit as to thinness that you have seen tried?

A. It is impossible to say; I have seen metal used not more than a 1/50 of an inch.

Q. 65. Now, Professor, when did you first discover or learn that spot-welding, as you have defined it could be practiced?

A. That is hard to say; certainly not before I heard of the Harmatta application being on file in the U. S. Patent Office through interference declared with pending application.

Q. 66. With whose pending applications?

A. I believe Rietzel's.

Q. 67. There was an interference declared between Rietzel's patent issued July 20, 1909, and the application for the Harmatta patent, but this interference was not declared until April 26, 1910, as appears from the certified copy of declaration now before me. Can you say that you had never heard of spot-welding before the year 1910?

A. No, I don't think I can. I know nothing about these details which you are asking about now. It would be a mere guess even if I should attempt to answer.

Q. 68. You can at least tell me where you first saw a machine designed and intended for the practice of spot-welding, can't you?

A. Not absolutely, but I think it was at the Thomson Electric Welding Co. at Lynn.

Q. 69. And you can tell us where you first saw a spot welded article, can you not?

A. No, I cannot.

Q. 70. Didn't the Thomson Electric Welding Co. put out spot

welding machines designed and intended for spot welding as early as the year 1905?

A. I don't remember that they did. And I want to say in explanation, it might be assumed by the question that I was in close touch with the business of the Thomson Electric Welding Co. This has not been the case since the early days, and even then my time was given mostly as it has been ever since, to the work of the General Electric Co., the range of whose work is enormously great.

Q. 71. Is it not the fact that the Thomson Electric Welding Co. constructed and marketed, or at least leased, spot welding machines for making what you have defined as spot welds before it had knowledge of Harmatta or his application?

A. I don't think so; I don't remember so. Mr. Rietzel was working on projection welding quite early, but that was different, though I wouldn't undertake to say just when his work was done or when the machines were marketed. This is explained by the fact, as pointed out before, that I was not in steady touch with what was going on at the welding company, my time being taken up in many other directions.

Q. 72. You are not sure that you got your idea of spot welding originally from Harmatta or his application, are you?

A. Oh, yes, I am sure. That is exactly the point. I was very much surprised when I first learned of Harmatta that we had missed in our development such a simple and beautiful application.

Q. 73. You would now be surprised if it should transpire that your company, as well as other concerns in this country, had built and operated spot welding machines without any knowledge whatever of Harmatta or of his application for patent, would you not?

A. I should want to find out about it, I should want the truth and all the circumstances; it might be even a question of interpretation which I am not willing to assume on the strength of counsel's statement.

Q. 74. Wherever you got your idea of spot welding as you have defined it originally, you are of the impression that it was from someone connected with the Thomson Electric Welding Co. Am I right about this?

A. Yes.

Q. 75. Your original patent of 1886, No. 347,140, covering the art of welding, did not expire until the year 1903, did it?

A. It ran 17 years.

Q. 76. Up to the time of the expiration of that patent, the Thomson Electric Welding Co. made and leased machines under that and other patents of yours, did it not?

A. Yes.

Q. 77. The policy of the company was not to sell but to lease machines, was it not?

A. Yes; the first arrangement was to endeavor to collect royalty on the welds made, which after all was the only just way because the invention was not simply the machine, but the welding itself

was the novelty to be charged for; but it was found practically impossible to get any proper return that way, and the leasing plan was finally adopted, and largely on account of the fact that it had worked well with other organizations, that the business was a special one and the machines were special and oftentimes very expensive in working out.

Q. 78. It was a customary provision in those leases put out by the Thomson Electric Welding Co., authorizing the use of electric welding machines to require the lessee, with knowledge of and to agree not to contest the validity of any of the patents comprehended by the lease during the life of the patent which had the longest term to run, was it not?

A. I think you are right; I have not read the lease for so long time that I cannot guarantee the provisions. It was a matter in the hands of counsel.

Q. 79. Before the expiration of your original patent—I mean the fundamental patent of 1886—the art of electric welding had advanced by leaps and bounds, had it not?

A. It was very uphill work in the early days to get people to even take hold of the new process, one of the chief reasons being that electricity was not on tap, as it is today, everywhere, and its introduction meant oftentimes a special power plant: many of the users regarded it as a kind of experiment and did not want to go to that expense.

Q. 80. By 1905 the employment of electric welding had become quite general and other concerns beside the Thomson Electric Welding Co. began to put out electric welding machines, did they not?

A. No, I don't think they did; very few.

Q. 81. Well, four or five, certainly?

A. I think the statement rather exaggerates the conditions. As I said before, the business did not go on by leaps and bounds; it was comparatively slow in the early days, and that might have been true up to 1905, considering the enormous range of metal manufacture to which it was possible to make application of it.

Q. 82. There is a good deal of electric welding done today that is not spot welding, according to your definition, is there not?

A. There is, certainly. And in the earlier days there was a good deal done because one machine would do a great lot of it in a year.

Q. 83. Will you mention some of the special applications of electric welding other than spot welding that exist today?

A. Butt welding is used in wire work of all kinds; it is used in building parts of machine tools like drills, reamers, etc.; it is used in modified form for metal tires ranging from baby carriage tires and toy vehicles up to automobile rims and heavy truck rims, which is the largest work of the kind; it is used in repair work, replacing worn parts of tools; it is used in many metal manufactures which I do not need relate at present; seam welding used in tanks and bath boilers, containers; then there is the longitudinal seaming of steel tubing which has developed considerably; automobile parts,

casings for gears, and the like, butt welding; electrically welded wire fencing, and many others.

Q. 84. Has not this extension of butt welding and seam welding, and other kinds of welding besides spot welding been influenced by the general prevalence and availability of current?

A. Yes, that has helped very much and also the fact that utensils of steel are more common than formerly.

Q. 85. And has not the extension of electric welding of all sorts been due to some extent to the running out of the dominant patents issued to you and to others owned by Thomson Electric Welding Co.?

A. I must confess I cannot estimate how much influence that has had.

Q. 86. Do you regard it as essential that electrodes used for spot welding be tapered or reduced toward their contact faces? Cannot cylindrical or square electrodes of uniform dimensions throughout be successfully used for spot welding?

A. It simply amounts to this: that the cylindrical electrode breaks down or spreads at the edges and becomes convex through use, in which case it may be said to have tapered itself. For such a soft metal as copper it is well to have the electrodes cooled, especially at the tips, and it is conducive to this cooling to make the body a little away from the weld larger, as by tapering at the end and this ought to be done very abruptly for the best results. The heat is not only carried off better, but the resistance of the electrode of lower temperature is less and the section for carying the current is much larger right up to the weld; all of which is electrically sound; inasmuch as we do not want to waste energy in heating the electrode itself but only the weld. I have even known steel electrodes very blunt and water-cooled to have been used successfully. When I say water-cooled I mean cooled by internal circulation of water right down to the end. There is nothing essential in the form, in view of the fact that I have pointed out that the wear tends to convex the electrode.

Q. 87. Wear tends to convex the contact surfaces of electrodes that are tapered, does it not?

A. Nothing like so much and nothing like so soon.

Q. 88. In practice, are not even tapered electrodes required to be frequently repointed, so to speak, by filing, or otherwise?

A. Yes, usually being made of copper or soft metal, they need redressing.

Q. 89. With what sort of metals have you dealt in the production of electrodes for spot welding machines?

A. Mostly copper and bronze; not myself, because I haven't done much of that work.

Q. 90. Tungsten, being of relatively high conductivity and low resistivity, would answer well and might be used were it not so expensive, am I right about this?

A. Yes; I have known of its being used in special ways and in special cases, and with considerable success.

Q. 91. How about iridium; might not that be used but for its high cost?

A. It is not as good a conductor as we could wish, and the cost is about $175 an ounce.

Q. 92. But you think it might answer for an electrode for a spot-welding machine if the cost were not too high?

A. It might if it did not have so high a resistance which would waste energy; I don't think anybody is likely to try it.

Direct examination closed.

Cross-examination by MR. STACKPOLE:

X-Q. 93. You have been asked concerning your patents No. 347,140, 347,141, 396,015, 444,928 and 496,019. Do any of these patents describe the Harmatta process of spot welding?

A. Certainly not.

Deposition closed.

Adjourned until further notice.

ELIHU THOMSON.

State of Massachusetts, County of Suffolk, ss.:

I, GEORGE C. ARVEDSON, a notary public within and for the Commonwealth of Massachusetts, duly commissioned and qualified and authorized to administer oaths and to take and certify depositions, do hereby certify that, pursuant to the annexed notice issued and served in the civil cause pending in the United States District Court, for the Eastern District of Michigan, Southern Division, wherein Thomson Spot Welder Company is plaintiff and Ford Motor Company is defendant, I was attended at the office of Messrs. Fish, Richardson & Neave, 84 State Street, Boston, Massachusetts, by J. L. Stackpole, Esq., counsel for said plaintiff, and by Melville Church, Esq., counsel for defendant, on the day hereinbefore stated, to-wit, on July 1st, 1918; that the aforenamed witness, Elihu Thomson, who was of sound mind and lawful age, was by me duly sworn to testify the truth, the whole truth, and nothing but the truth, and he thereupon testified, as is shown in the foregoing deposition annexed; that the said deposition was by consent of counsel reduced to typewriting by Blanche Levy, in the presence of the witness himself and from his statements and in the presence of said counsel for said parties at the place indicated and at the time set forth; that by agreement of counsel the testimony was taken partly in my presence and partly during my absence; and that the said deposition was duly signed by the said witness.

I further certify that the reason for taking said deposition was and is, and the fact was and is that the said witness lives more than one hundred miles from the place where the said civil suit is

appointed by law to be heard; that I am neither of counsel nor attorney for either of the parties to the said suit, nor interested directly or indirectly in the event of said cause; and that by agreement with counsel the said deposition has been my me delivered to counsel for defendant with the understanding that he is to deliver it into the custody of the Clerk of the Court before trial.

WITNESS my hand and seal at Boston, Massachusetts, this eleventh day of July, 1918

GEORGE C. ARVEDSON,
Notary Public.

(Seal)

My commission expires Sept. 25, 1924.

UNITED STATES DISTRICT COURT.

EASTERN DISTRICT OF MICHIGAN.

SOUTHERN DIVISION.

IN EQUITY.

THOMSON SPOT WELDER COMPANY, Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

HARMATTA PATENT No. 1,046,066.

Deposition of Frank L. Dyer, taken in behalf of the defendant, at the office of Messrs. Church & Church, 908 G Street, N. W., Washington, D. C., on the 22nd day of July, 1918, before Thomas Durant, a notary public in and for the District of Columbia, pursuant to agreement.

Present: GEORGE C. ARVEDSON and J. L. STACKPOLE, Esquires, for the Plaintiff.
MELVILLE CHURCH, Esquire, for the Defendant.

FRANK L. DYER.

FRANK L. DYER, a witness produced in behalf of defendant, having been duly sworn, deposes and says, in answer to questions propounded to him by MR. CHURCH, counsel for the defendant, as follows:

Question 1. What is your name, age, residence and occupation?

Answer. My name is Frank L. Dyer; my age is 47 years; my residence is Montclair, New Jersey; and I am at the present time engaged in the manufacturing business, although I am frequently

consulted as an expert in matters relating to patents and have occasion frequently to testify as such in patent suits.

Q. 2. What have been your educational advantages, training and experience qualifying you in your judgment to testify as an expert in relation to the art of electric welding?

A. For upwards of thirty years I have given very close consideration to matters relating to inventions. I practiced actively as a patent lawyer and solicitor up to the year 1908, and during that time had occasion to prepare and prosecute in the Patent Office several thousand applications for patents relating to many diverse arts, including electrical inventions of various kinds. From the year 1897 to the year 1908 I prepared all of the applications for patent of Thomas A. Edison and during most of that time I was the general counsel for Mr. Edison and the various corporations which he had formed at Orange, N. J. From the year 1908 until the end of 1912 I had general executive charge of these various Edison Companies, devoting my time very largely to commercial and practical manufacturing considerations, and since then my time has been largely occupied in connection with manufacturing questions. From the year 1903 until the end of 1912 I was located at Orange, N. J., in practical daily touch with Mr. Edison, and familiarized myself with his methods of experimenting and carried out on my own behalf many experiments myself. This was a very illuminating experience. I am associated with the American Institue of Mechanical Engineers. I have made many inventions myself, some of them relating to electrical subjects, including electrical welding generally as well as so-called spot welding, and have filed thereon, I think, more than one hundred applications for letters patent. I have been familiar generally with principles of electric welding for many years. More recently I have had occasion to look more intimately into the subject and have frequently had occasion to operate butt welding machines as well as spot welding machines with the purpose in view of finding out as much as I could about them and their operations. I have built a spot welding machine myself which I have frequently operated. During the time that I was intimately connected with Mr. Edison in the capacity of vice president of the Edison Storage Battery Company we had occasion to make use of oxy-acetylene welders for welding in place the tops of Edison storage batteries, so that I thus became familiar with this type of welding also.

Q. 3. Into what main divisions is electric welding divided?

A. Speaking generally, I should say arc welding, which in turn is sub-divided into processes using carbon and metal electrodes respectively, and second, resistance welding, or the so-called Thomson process. There seems to be some development also in so-called percussion welding.

Q. 4. How is arc welding practiced?

A. By causing an electric arc to be formed between a suitable electrode and the plates or metallic objects to be heated whereby the latter are brought to a very high temperature and frequently by

the use of a so-called melt bar to supply metal to the cracks or place to be welded. Also by causing the heat of the electric arc to be carried by conduction to the plate or metal object to cause a weld to be formed between surfaces to be joined.

Q. 5. What is resistance welding? I ask you to describe some applications of it in giving your answer?

A. Resistance welding or the so-called Thomson process is that in which the surfaces to be joined or welded are brought to the welding temperature by reason of their resistance to an electric current of large amperage which traverses the joint between the parts, the heat being localized as nearly as may be to the surfaces in contact or at least to the neighborhood of the contacting surfaces and after the metal at the contacting surfaces has thus been raised to the welding temperature pressure being applied to bring the heated parts into intimate molecular cohesion, thus forming a weld and practically consolidating the two parts into one. This resistance process of electric welding was first disclosed by Professor Elihu Thomson in his United States patents No. 347,140 and No. 347,141, of August 10, 1886. In the first of these patents the process is shown as being applied in a number of industrial fields, such as joining the ends of wires or bars (Fig. 3), securing rectangular bars together (Fig. 10), welding a shank to what appears to be a valve (Fig. 11), welding a round to a rectangular bar (Fig. 12), joining the ends of a ring (Fig. 14), and welding two smaller pieces to a larger piece (Fig. 15). In the second patent the process is shown for repairing the shank of a broken drill (Fig. 7) and also for welding the handle on a knife blade (Fig. 8). Obviously, when once the suggestion has been made of effecting a welding operation by utilizing the resistance of the work itself as well as the resistance between the parts to be welded, the carrying out of the process in various industrial fields became simply a question of engineering skill and required only the designing of a machine electrically to give the required heating current and the designing of proper clamps and electrodes to engage the parts to be joined properly together and to apply the proper pressure to the same to effect the welding operation. Some of the uses to which the underlying principles of the Thomson process or resistance welding may be applied are indicated in other and later patents granted to the Thomson Company, to which I will briefly refer.

First, I call attention to Thomson patent No. 396,015, dated Jan. 8, 1889, in which the same idea of utilizing the heating effect due to the resistance of the work is employed for the purpose, primarily, of heating a rivet blank sufficiently to permit it to be properly headed. Referring, for instance, to Fig. 1, it will be seen that the rivet blank R is placed in holes formed in the overlapping plates P, P', a heating current being led to the rivet blanks by electrodes E', G. The current passing through the rivet blank R will heat the same, because the rivet blank, being of smaller cross section than the electrodes, will therefore have a higher resistance and the heat will thus be largely localized in the rivet blank. After

the rivet blank has thus been heated to the required temperature to be sufficiently soft, the electrodes are caused to approach each other to the position shown in dotted lines in Fig. 2, thus forming or upsetting a head on each end of the blank and completing the riveting operation. Now, it will be noted that this Thomson patent describes two other things to which I would like to refer as indicating a further but perfectly logical development of the resistance process. In the first place, after stating that the current may be allowed to flow only to a sufficient extent to permit the swaging or heading of the rivet blank, the patent then says,—

> "or the current may be allowed to pass for a longer period and until the central portion of the rivet, as well as the metal near thereto, is raised to a welding temperature, when the application of pressure expanding the rivet in its seat will weld the same to the metal surrounding it and the application of pressure to the pieces to be riveted will weld them together around the rivet." (Page 1, lines 25-33).

I think the foregoing is perfectly clear; heat will obviously be carried by conduction to the metal surrounding the rivet and that metal, in the immediate neighborhood of the rivet will thus also be softened and also there will be a flow of current through the metal in the immediate neighborhood of the rivet because, as is well known, when metal is heated its resistance is increased and the metal surrounding the rivet would therefore offer a path of somewhat less resistance through which the current will pass and thus supplement the heating effect due to conduction from the heat of the rivet blank. Therefore, as Thomson points out in his patent, when a consolidating pressure is applied by the electrodes the rivet is not only headed, but is also welded to the surrounding metal and there will also be a welding of the plates themselves in the immediate neighborhood of the rivet. In other words, the rivet and the plates are practically consolidated, as shown in Fig. 6. In the second place, Professor Thomson, in this same patent says,—

> "In some cases I may cause the electric current to flow across from pieces to piece of the parts to be riveted, as well as through the rivet itself." (Page 1, lines 33-36).

The apparatus for carrying out this suggestion is shown particularly in Fig. 9, where, in addition to the heading or swaging electrodes for the rivet a heavy clamping piece is shown in the form of two electrodes engaging the plate in a diametric line with respect to the rivet blank, and these electrodes being in line with the corresponding electrodes engaging the other plate. If the mica blocks m, m', shown in Fig. 9, are interposed between these clamping electrodes and the plates, no current will flow, except through the rivet blank, and the function of the clamping electrodes will therefore be simply to press the plates tightly together. But Pro-

fessor Thomson recognized that the electrodes did not have to be insulated from the plates as shown in Fig. 9, but, on the contrary, he recognized that if they were not insulated a heating or welding current would traverse the plates between the opposed electrodes and thus weld the plates together at points corresponding to said electrodes. In other words, a situation will be presented where there are three paths for the current to take, one being through the rivet blank and the other two being through the plates themselves, and with this apparatus therefore three distinct operations will be performed, first, the rivet blank after being heated will be swaged or headed and second, two separate isolated welds will be formed, each of limited area on opposite sides of the rivet in a diametric line. This, I understand, is what the patent means by the statement I have already quoted, that the current may "flow across from piece to piece of the parts to be riveted", as well as from the following quotation from the patent:

> "By the use of this form of apparatus a heating electric current might be passed through the metal plates themselves at parts around the rivet by means of the pressure pieces or clamps K, K'. Such current would assist in raising the portions of the plates immediately surrounding the rivet to the welding temperature." (Page 2, lines 68-75).

and I understand this is the effect that is referred to in the 6th claim which I quote:

> "6. The herein described method of fastening two pieces of metal together, consisting in passing a heating electric current through a rivet or rivet blank, passing through the pieces as well as through the pieces of metal themselves in the neighborhood of the rivet, and applying pressure to set the rivet and *weld the pieces together.*"

I think it very clear that the comma in line 4 of the above claim should be introduced after the word "pieces", in line 5; in other words, the rivet or rivet blank passes through the pieces and the heating current passes both through the rivet blank and through the pieces themselves. The special significance of this particular Thomson patent, to my mind, is that, whereas, in his two fundamental patents of August 10, 1886, heating current was simply conveyed to the work and the engaging surfaces themselves determined the area or extent of the weld, in the patent of January 8, 1889, (No. 396,015), Professor Thomson recognized that conducting electrodes, if placed oppositely to each other, in contact with the two plates, would themselves concentrate the current in the work or, in other words, the current will follow the path of least resistance and hence will take the most direct path through the work from one electrode to the other. Thus, the heating current, passing in this way through the work from one electrode to the

other and being concentrated by the electrodes, will form a weld depending in size and shape upon the size and shape of the electrodes, and that weld will be isolated and will be surrounded by areas of non-welding. Not only will the electrodes thus concentrate or localize the current, but they also concentrate or localize the pressure, so that when pressure is applied the metal will be joined at the point or place or spot where the welding heat has been concentrated. The patent to Thomson which I have been considering thus shows further examples of the universality of resistance welding. When rivets are to be heated, the current is passed through them, converting the electric energy into heat, softening the metal, and permitting the swaging operation. If two plates are to be welded together in limited areas, the welding current is applied by means of electrodes which cause the current to be concentrated in a more or less distinct path, cutting the joining edges which are thus brought to the welding temperature, so that when the required pressure is applied a weld will be formed.

The next Thomson patent to which I will refer shows a further carrying-out of the same idea of resistance welding in which the resistance of the work itself is taken advantage of to secure the heating effect and thus bringing the engaging surfaces to the welding point. This patent, No. 444,928, dated Jan. 20, 1891, shows the welding together of two plates, the edges of which overlap by a continuous longitudinal weld such as might be desirable, for example, in the formation of seams in pipes or between plates. Such a weld is produced by overlapping the two plates M′ and engaging the lap on opposite sides between roller electrodes R, R′, through which the current passes to the plates. The current is thus concentrated or localized by the electrodes; in other words, the current passes from one electrode directly to the other and the maximum heating effect is thus secured in the path to which it is thus confined, which path cuts the engaging surfaces of the two plates so as to largely localize the current at that point. A device such as the screw S is used to apply pressure to the electrodes. The operation is thus described:

> "The edges are slightly overlapped, as shown, and the plates, being in position between the rolls, may be squeezed together by means of the screw S, thus forming an electric contact between them. The electric current being now turned on as it passes from one roller to the other and across the points of pressure will heat the work to the welding temperature and soften the same slightly, after which the screw may be given a few more turns to effect a solid union. The work, having been thus started, may now be moved along through or between the rollers, so as to bring successive parts of the joint into position to be pressed and heated at the same time. By this operation the metal will become thoroughly united as it passes through and out from between the rolls. It is obvious that the speed of the operation may be varied by varying the

rate of heating and the rapidity at which the work may be fed through the rolls." (Page 1, line 84; page 2, line 11).

When this patent refers to the preliminary welding of the plates "to effect a solid union" by first causing the roller electrodes to feed current to the work in a localized path and thus concentrate the current in a limited area at the weld by reason of the pressure applied to the electrodes by the screw, it does not add anything to the disclosure of Thomson patent No. 396,015, wherein the same thing is done, as I have explained, but where the patent further discloses the formation of a continuous weld by causing the work to progress with respect to the roller electrodes which continuously feed current to the work and cause progressive welding of the seam, it discloses a further carrying-out of the same general principles of resistance welding in which the resistance of the work itself is utilized to develop heat within the work to bring the surfaces to be joined to the welding temperature, the weld being formed when the requisite pressure is applied thereto. By using a pair of rollers as electrodes for conducting the current to the plates and concentrating the current and pressure therein to form a progressive weld, it is possible to utilize the process for the welding of strips of any length whatever, but in Fig. 2 Thomson discloses a modification in which the length of the weld is limited. Here, instead of employing roller electrodes, a pair of electrodes are shown each in the form of a segment of a circle and the length of the weld will therefore be limited to the length of the circumference of these segments. Otherwise the operation is the same as when roller electrodes are used, that is to say, the electrodes first engage the work to concentrate the current and form a preliminary weld between the engaging surfaces of the two plates. Pressure is then applied to squeeze the work tightly and consolidate the weld and then the work is moved downward so as to produce a progressive weld whose length is determined by the extent of the engaging surfaces of the two segments. The patent states that with this modification the strips or plates "are of comparatively limited length in the direction of the joint" (Page 2, lines 15, 16), but the operation of the apparatus and the carrying out of the described method would be the same, if very much longer plates were used, each operation producing a weld of a certain length and these welds being connected together or isolated, as might be desired. I observe that in this Thomson patent No. 444,928 the overlapped edges of the sheet lie within the working faces of the roller electrodes, so that while the electrodes concentrate and localize the heat and pressure longitudinally, it might be said that they do not localize the heat and pressure transversely. This seems to me to be an immaterial point, having nothing whatever to do with the principles of the invention but, in this connection, I call attention to the Lemp patent No. 553,923, of February 4, 1896, also owned by the Thomson Company, in which (Fig. 2) it very clearly appears that the roller electrodes are throughout their engaging surfaces located

entirely within the overlapped portion so as to concentrate the current and pressure by their engaging surfaces. It will not be necessary to consider this Lemp patent in detail, and I call attention to it solely because it very clearly discloses the use of electrodes which do in fact work within the area of the overlapped portions and which, therefore, do in fact indisputably localize the current and pressure.

The next patent to which I will refer shows a further field of usefulness with which the principles of resistance welding may be used, namely, the heating of two plates or pieces of metal electrically by reason of their internal resistance, such heating being utilized for the purpose of permitting a soldering of the two plates to be effected. This is the Thomson patent No. 496,019, dated April 23, 1893. Referring, for instance, to Fig. 1, if it be desired to secure the two plates P. P' together, they are engaged by electrodes C C', so that the heating current will heat the plates to the desired point to melt the solder, after which the current is cut off and the joint allowed to cool. Of course, with a soldering operation less current is used than with a welding operation, if we have reference, for example, to iron plates, and solder suitable for uniting iron plates. In other words, the heat required to melt such a solder would obviously be very much less than the heat necessary to bring the plates up to the welding temperature. But these things are purely relative; if you have to weld plates or pieces of iron, you use a higher temperature than when you weld plates of copper, and if you wish to weld plates of tin, although I have never tried it, I have no doubt that the heat would be very much less than for welding copper. With any weldable metal (and Professor Thomson in his original patent refers to "copper and its alloys, iron, silver, gold, etc.) the aim is to bring the metal up to the welding heat, so that a weld can be formed when pressure is applied, and I think it is the universal rule that this welding heat is always of a more or less extended range below the melting point. Therefore, in making the weld the object, as I have stated, is to so regulate the current and the time as to raise the metal to the welding point, when pressure is applied. Now, the reason why I have made this digression is because Professor Thomson, in this soldering patent No. 496,019 under consideration, says:

> "When applied to tin plate the tin itself which covers the iron plate is often sufficient for the uniting solder." (Page 1, lines 12,-14).

And again he says:

> "In the case of the pieces P P', of tin plate, a union takes place at the overlap when a sufficient strength of current to melt the tin between the surfaces has been passed." (Page 1, lines 96-100).

It seems to me that when we are dealing with tin plates an operation is performed that really is true welding, or, at least, so analogous to welding as to make it difficult to draw a distinction between the two. In other words, a tin plate can be regarded as a composite sheet, namely, a sheet of iron and a sheet of tin, and when these two composite sheets are placed together and the current applied, as suggested by Professor Thomson, there is a welding of the tin plates or layers, just as I believe there would be if the iron sheets were not present. While this patent, describes a soldering process from the standpoint of iron, in my opinion it describes a welding process from the standpoint of tin. It is a fact, referred to in the literature of the art, that Professor Thomson has in his possession a bar composed of nine distinct metals, welded together in line and manifestly in its formation there must have been a proper adjustment at each weld of the current to secure the desired welding temperature. In Thomson's patent No. 496,-019 all sorts of modifications are shown and described by him illustrating the very extensive practical variations which can be made in applying resistance welding in various fields. For instance, in Fig. 2 the joint is shown as coextensive in length with the overlap of the plates, while in Fig. 3 a double-lapped joint is made tight and rigid by electrical soldering. And in Figs. 21 and 22 plates are shown which clearly are overlapped to a greater extent than the area of the electrodes, so that the current and pressure will be localized by the electrodes and the joint, whether it be a soldered joint or a welded joint, will be an isolated separate point, place or spot of attachment surrounded by metal of relatively large area in which there is no joint. This Thomson patent is of interest because it represents a further extension of the principles of resistance welding. Heretofore I have considered examples of resistance welding or riveting or soldering, as the case may be, in which the heat is developed from within the metals themselves due to their internal resistance. Of course, in any welding circuit heat will be developed elsewhere than in the work and in proportion to the resistance, and usually any heat thus developed outside of the work represents a loss of energy, and the usual practice is to reduce this loss as much as possible by having the secondary circuit of preponderous dimensions and water-cooling the conductors and electrodes. Nevertheless, when carrying on a resistance welding operation, even when water-cooled copper electrodes are used, the electrodes get very hot and a great deal of heat is developed where the electrodes engage the plates, so much so that the electrodes some times stick to the plates and they disintegrate and require to be quite frequently retrimmed by filing. In the patent under consideration, Professor Thomson points out that advantage may be taken of the heat developed in the electrode, and he shows in Fig. 7 the facing of the copper electrodes with blocks of hard carbon F, F', which he states is "for the purpose of producing an electrical resistance at the work, or where the current enters the work, which tends to the accumulation of heat thereat

with less current strength". (Page 2, lines 46-50). With this arrangement shown in Fig. 7, therefore, whatever heat is developed in the carbon layer on each electrode it is carried by conduction into the metal and thus reaches the joint between the parts. The current itself also traverses the plates and heats them by reason of the relative resistance of the plates. The respective heating effects thus secured by conduction from the heated carbon block and internally by reason of resistance will depend obviously upon the resistance of the blocks themselves and their contact resistance with the plates compared with the resistance of the plates. With thick carbon blocks most of the heating effect would be due to conduction. Professor Thomson, in this patent, points out other ways by which external heat can be produced than by the use of carbon blocks, namely, by providing the engaging faces of the electrodes with ridges, serrations points or projections whereby a condition of relatively high resistance is formed at the joint or place of contact between the electrodes and plates. This has a very similar effect to that secured when carbon blocks are used, except that with carbon blocks all the heat therefrom reaches the joint by conduction, whereas by concentrating by a large number of points or projections, as suggested by Professor Thomson, at each point there will be a concentration of the current and a consequent heating effect within the plates themselves.

This soldering patent so far as it discloses application of the heating current by means of an electrode which concentrates the current and pressure adds nothing to the Thomson patents already considered, but its suggestion of utilizing an external heating effect obtained by the same resistance principle is a further refinement in the art.

I have now referred to several Thomson patents which I had in mind to take up in answering your question, but before passing on to the work of other prior inventors in the art, I would like to refer to another patent of the Thomson Company's, for the purpose of illustrating the extent to which this same resistance principle had been applied by them. I refer to the patent to Lemp, No. 531,197, dated December 18, 1894. The patent relates to a process for softening in spots extremely hard steel plates, for instance, armor plates, so as to permit bolt holes, for example, to be drilled through the plates. It does not relate to welding, but it does disclose in my opinion a degree of engineering knowledge which I think would comprehend all the difficulties and problems that could arise in connection with welding. The patent says:

> "My invention consists essentially in hardening the whole piece of steel or other metal, then locally heating *the spot* or portion in the body thereof to be softened, to the proper temperature by an electric current passed to the metal itself." (Page 1, lines 21-26).

And again:

> "My invention consists further in certain appliances designed to aid in the purpose of locally heating by the electric current and of confining the heating to the desired spot." (Page 1, lines 42-45).

Referring to Fig. 4, it will be observed that B, B are two electrodes engaging the plates H at opposite sides and in line with each other, and in Fig. 3 these electrodes are clearly shown as much reduced in area at their engaging faces, the purpose for which is stated in the patent as follows:

> "As will be seen in Figs. 3 and 4, the electrodes or contacts where they engage with the mass of metal are made rather small, this being for the purpose of *localizing the heating current* so far as possible and the undue heating at such points is prevented by the artificial cooling." (Page 3, lines 101-107).

The arrangement shown in Fig. 4 is thus described:

> "If the plate or piece of metal be hard enough its whole thickness and not merely on its skin surface, the current may be made to enter at one side and leave at the other, passing entirely through the mass of metal." (Page 2, lines 46-51).

The electrodes shown in this patent are described as being of copper (Page 2, line 98), and they are shown as being hollow, so as to be water-cooled, the advantage of which is thus described:

> "By thus keeping the contacts artificially cooled the heating of the mass of metal is better localized at the portions thereof between the electrodes themselves. In practice it will be found that when only a slight contact pressure is used there is a tendency of the metal at the surface in contact with said electrodes to heat more than at the portion between them, but by artificially cooling the electrodes the heating may be better confined as stated." (Page 3, lines 34-44).

Finally, the patent points out that by concentrating or localizing the current in the plate by means of substantially pointed electrodes, the metal in the spot to be heated can be brought "to a dull red heat" (Page 2, lines 29-30), and, of course, no one will question the fact that a higher heat will be secured if more energy is allowed to be converted into the heat within the path between the electrodes. Although, as I have said, this patent does not relate to welding, I refer to it simply for the purpose of showing how far the engineering knowledge of the Thomson Company had gone, at least as early as 1894. I point out the following features which are of special utility in the practice of welding: First, the fact that when two substantially pointed electrodes are engaged on the opposite faces of flat metal conductors, like two plates in contact, the current will be concentrated by the electrodes so as to follow a path immediately between them and thus localizing the heating effect. Of course, I do not mean to say that *all* the current flowing between the elec-

trodes is thus confined to a localized path as fully as it would be, for instance, as if following a rivet blank; there is a diffusion of the current outside of this path in proportion to the resistance, but, nevertheless, the current concentration applied in this way is sufficient to produce a heating effect. Of course, this fact has been previously recognized by Professor Thomson in the three patents to which I have referred, and I would not make a particular point of it, if it were not for the fact that Mr. Frank N. Waterman, who testified as expert for the complainant in the case of Thomson Spot Welder Company vs. Barney & Berry, Inc., was apparently impressed with the fact that this was a new idea with Harmatta. Thus Mr. Waterman said:

> "It is based upon what is, electrically, a very interesting idea. If we place in superficial contact two extended surfaces all ordinary laws of electrical flow indicate that the current will distribute itself over the surfaces and flow alike through the entire areas in contact. Harmatta evidently conceived the idea that he could localize the current in particular limited areas of the contacting surfaces by the application of pressure."

After then referring to the well known Joule effect, Mr. Waterman continued:

> "Now the current distributes itself in such a way, under ordinary circumstances, that the losses shall be least. Harmatta made a departure, from ordinary conceptions, in that he localized the current path in extended areas of contact by pressure, therefore concentrating the current in an area determined by the area of the applied electrodes, bringing that limited area to a welding temperature without material heating of the adjacent parts." (Transcript of Record, Barney & Berry Suit, Vol. 1, page 59.)

Of course, from an electrical standpoint, there is no distinction, as I view it, between a single plate, as described by Lemp and two extended surfaces in superficial contact, and if this is so, I find in the Lemp patent the precise character of current and heat distribution that Mr. Waterman believed was conceived by Harmatta.

Second, I find in the Lemp patent, not only substantially pointed electrodes concentrating current, but electrodes of copper so as to minimize waste due to heating effect in the electrode material.

Third, I find in the Lemp patent the suggestion of water-cooling the electrodes so as to keep their temperature as low as possible and prevent increase of resistance to the heating and also reducing the resistance between the electrode and the material to which the current is applied.

I will now refer to a few more examples illustrating the utilization of the same principles of resistance welding by others than the Thomson Company, not for the purpose, by any means, of exhausting the subject, but for the purpose of calling attention to prior

examples of resistance welding in which there is concentration or localizing of the current, whereby the welds appear as isolated points of attachment surrounded by extended areas of non-welding. I, therefore, next call attention to Robinson patent No. 574,942, dated January 12, 1897. In this patent the joint between two adjacent rails is formed by electrically welding a girder plate to the bottom of each rail, the adjacent girder plates being then bolted together, and by also electrically welding a splice bar between the adjoining rails to strengthen the joints and if used for electric railway purposes to reduce the resistance at the joints. Both in the electric welding of the girder plates to the rails and in the electric welding of the fish plate thereto, this patent is of special interest. The girder plate is shown at B, Fig. 2, and also in Fig. 1. It will be observed that there are three ribs or points *d* on the upper face of the girder plate, concerning which the patent says:

> "The upper surface of the plate B is provided with a slight upward projection or contact point *d*. These points are brought in contact with the bottom of the rail in proper position preparatory to welding. When the welding current is turned on, it is localized at the point *d, and only these points and the corresponding points of the rail are brought to a welding heat.* As a consequence the weld is much more quickly made and with much less current than if the continuous upper surface of the plate B were brought in contact with the rail. This arrangement, therefore, is in the interest of economy and practicability. Perhaps a much more important consideration, however, is this: When the contact point *d* and the corresponding points of the bottom of the rail have reached a welding heat and the plate B and rail A are rigidly clamped together to produce the weld, the intervening part *e* of the upper surface of the plate B and the parts of the rail corresponding thereto have not been raised to a welding heat. Consequently, when these parts come together, the welding compression can force them no farther, and therefore the parts *e* and the normal bottom of the rail are retained in perfect alignment with the upper surface *f* of the other end *g* of the plate B. Thus provision is made for keeping the lower and upper surfaces of the adjacent rails in perfect alignment." (Page 2, lines 17-48).

Adjourned until Tuesday, July 23rd, 1918, at 9:30 A. M.

Tuesday, July 23rd, 1918.

Met pursuant to adjournment.

Present: Same as before.

Robinson employs the same idea of providing projections to concentrate the current and localize the welding in spots surrounded

by areas of non-welding, in connection with the welding of the splice bars or fish plates in position. The splice bar is shown, for instance, in Fig. 11, being provided with a number of points or projections which are also clearly shown in Fig. 12. The patent says:

> "When the plate C is placed in the groove of the rail in position to be welded, these projections *i* find a bearing against the rail adjacent to the upper and lower corners of the groove of the same. The projections *i* are normally long enough to keep the main body of the plate C a short distance away from the rail. As soon, however, as the welding current is turned on it quickly brings the projections *i* and the parts of the rail touched by them to a welding heat. The clamp is now applied to press the plate C and rail together to complete the weld, as shown in Figs. 13 and 14." (Page 2, lines 92-105.)

The patentee points out that instead of employing projections as described on the splice bar or fish plate, he may use a series of ribs as shown in dotted lines Fig. 16, but he says:

> "I prefer the arrangement of small independent projections to facilitate rapidity of welding, economy of current, and in order to have several small welding-spots distributed over the rail rather than to have any single large surface of the rail brought to a welding heat, since the latter would be liable to deteriorate the rail." (Page 3, lines 20-28.)

While, therefore, Robinson still makes use of the well known principles of resistance welding, he suggests the special refinement of welding the two pieces together in isolated spots (he calls them "welding spots") which will be surrounded by very much larger areas of non-welding, and he localizes the welding current in these spots by providing projections or points which are traversed by the heating current and brought to the welding temperature, likewise heating the plates with which they contact to the welding temperature, so that when pressure is applied each projection so heated will constitute or form a single spot weld.

The patent to Kleinschmidt, No. 616,436, dated December 20, 1898, discloses a very similar arrangement to that suggested by Robinson, except that the splice bar, instead of being formed with a considerable number of small projections, is provided with a somewhat larger single projection *b* near each end adapted to be electrically welded to the corresponding rail. The patent points out that—

> "The bosses *b* extend only a very short distance from the main body of the bar, so that they will not prevent the bar from making close engagement with the rail and so that any ten-

dency which they may have to bog out will be prevented by the rapid cooling and compression to which they are subjected." (Page 1, lines 77-84.)

The Kleinschmidt patent illustrates very clearly the apparatus for applying the heating current to the splice bars, whereby the current will be localized by the projections or bosses in the same way as with the Robinson patent. That apparatus shown in the Kleinschmidt patent also applies the requisite pressure which will be concentrated by the projection or bosses, and the patent states that this pressure may be very great (25,000 pounds) and be allowed to compress and consolidate the parts for some time after the heating current is turned off. (Page 2, lines 2-7.)

I next call attention to the Burton patent, No. 647,694, of April 17, 1900. This inventor proposes to make an apparatus adapted for general metal working in which advantage is taken of the principles of resistance welding. He employs an ordinary blacksmith's anvil which carries a flat bed electrode 100 made of "highly conductive material, such as copper" (page 1, line 104). For the other electrode Burton employs a large number of forms depending upon the kind of work to be done. Therefore, a number of these electrodes are mounted radially like the spokes of a wheel and carried on a pivoted bar 150 normally elevated by a spring 170 but adapted to be depressed so as to apply pressure to the work by a foot lever 180. Instead of using an ordinary transformer, Burton proposes to employ "a dynamo-electric generator of peculiar construction which has a wide range of current as regards both amperage and voltage and which will supply a primary current of large volume and low voltage." (Page 1, lines 69-73.) The source of the current manifestly is unimportant and in no way alters the process. The form or shape of the electrodes, or at least some of them, is shown in Fig. 1, one of them (240) being spherical and another (250) being conical. Apparently the latter form is intended for countersinking screw holes as shown in Figs. 3 and 4. An interesting form of electrode is shown in Fig. 13 which is described as being "adapted for riveting," but which engages the plates as shown in the drawings when the rivet head has been upset. This engagement of the electrode is less than the overlapped portions of the two plates shown in that figure. The patent says:

> "The invention is especially adapted for lap-welding by the use of a primary transverse current. The lap weld is superior to the butt-weld. No end pressure is required, and consequently there is no upsetting of the metal and no formation of a bulge or projection at the point, which is afterward required to be filed or hammered down." (Page 1, lines 14-21.)

And in describing the operation the patent says:

> "In the use of this apparatus the pieces to be lap-welded are adjusted or placed with their ends overlapping on the bed

electrode 100. Then the foot lever is depressed, and one of the electrodes of the electrode head is brought into contact with the work, whereby the circuit is closed and the current passes through the work in transverse direction across the overlapping ends of the parts to be heated. The current may pass in either direction from the generator and effect the result equally well. As soon as the piece is heated to the proper temperature, which may be ascertained by inspection thereof, the operator releases the foot lever and the spring 170 lifts the hinge lever 150 and takes the upper electrode out of contact with the work, whereby the circuit is broken. Then the operator may shove the work forward on the anvil and hammer the joint or otherwise finish it, as desired." (Page 2, lines 67-87.)

I understand from the foregoing quotation that any one of the several electrodes may be used at the option of the workman, and if the plates are overlapped as described and an electrode such as the spherical electrode 240 or the conical electrode 250 is used the current passing transversely across the overlapping ends of the parts will be concentrated so that the internal heat will bring the contacting faces to or above the welding temperature, the heat being localized in a spot of limited area dependent upon the area of contact of the upper electrode. So far as I can see Burton does not say in so many words that the upper electrode applies pressure to the work, but it is inevitable that this should be so, because it is simply impossible to shove down a foot lever without applying very considerable pressure to the work. The weight of the foot alone would apply considerable pressure. It would be humanly impossible for the workman pressing down on the foot lever not to apply pressure to the work. Therefore, I entertain no doubt whatever that, if any metal worker should operate the Burton apparatus for making lap-welds as he describes and kept on the current until the welding temperature is reached, a spot-weld would be formed due to the inevitable and necessary pressure on the electrodes applied thereto by the pressure of his foot on the lever 180.

The patent to Perry, No. 670,808, of March 26, 1901, illustrates another interesting example of electric welding by the resistance process, wherein, for example, crossed wires supported by suitable electrodes (see Fig. 1) are brought together so as to form a weld at their meeting surfaces, due to the internal resistance of the wires and the resistance at the point of contact and to the pressure applied to effect the weld. Such a process would be excellently adapted for the making of a wire fence. Perry suggests the use of current of very great volume and he also suggests the employment of very great mechanical pressure to force the parts together, whereby the weld will be formed practically instantaneously. In this way, he says the parts in the neighborhood of the weld are kept perfectly cool so that even when the wires are coated with a metal of relatively low melting point, like zinc,

"the covering is practically uninjured about the joint and the joint is thus rust-proof." (Page 2, lines 27-29.)

And the patent goes on to say:

"Further, by my invention two parts (of which one is under tension) can be readily welded, for, although the abutting or contacting portions thereof reach a high temperature for an instant, the heat is localized about said surfaces and does not extend through the entire body of the said parts, thus preventing the body from being stretched, elongated, or bent at the weld or dominated by the described stress or strain, as would be the case if the welding operation were continued, as was done prior to my invention, over such a period of time that the entire body of the metal became heated and softened, so that it would be affected by such stress or strain, for by my invention merely the contacting surfaces are softened." (Page 2, lines 29-45.)

I call particular attention to this patent as showing a recognition in the prior art of effecting welds practically instantaneously or at least in a very short interval of time by using current of great volume whereby the heat will be localized principally at the joint and sufficient time is not allowed for substantial conduction of heat into the metal away from the joint.

I next refer to the patent to Rietzel, No. 928,701, dated July 20, 1909 (application for which was filed February 24, 1905), showing the same process of electrically welding metals together which had previously been described by Robinson, above referred to. In fact, the arrangement shown in Fig. 3 of the Rietzel patent is identical with that of the Robinson patent, the projections *c* of Rietzel corresponding to the projections *i* of Robinson. As with the Robinson patent these projections act to localize or concentrate the heating current as well as the pressure so that when the welding temperature is reached and pressure applied a series of isolated or spot welds will be formed surrounded by larger areas of non-welding Rietzel describes a number of obvious ways of forming the projections which thus concentrate the current and pressure, for instance, by indenting one of the sheets (Fig. 1), or both of them (Fig. 2), or by casting corresponding projections on two plates (Fig. 4), or by interposing small metal disks between the two sheets or plates (Fig. 5), but in whatever way these projections are formed the process is the same, namely, the concentration of current and pressure at localized spots (or "small welding spots," as Robinson calls them) by which two plates or other objects will be intimately held together, said welding spots being surrounded by extended areas of non-welding, all as had been previously fully explained by Robinson, together with the advantages in actual practice arising therefrom.

Turning now, for a moment, to the foreign prior art, I direct attention to the German patent of Benardos, No. 50,909, dated May 8, 1889, issued February 19, 1890. The patent refers to the welding of "thin plates" and the first claim refers to "local heating." Fig. 2 illustrates a simple form of apparatus designed for local heating and thus welding together thin plates or other suitable metal objects. The apparatus is in the form of a pair of tongs composed of two levers K′, K″, pivoted together at C, but electrically insulated one from the other, having wooden handles H′, H″, by which pressure may be applied and adapted to be connected to the terminals of suitable heating current. At the outer ends of the lever K′, K″, are electrodes w′, w″, which engage opposite sides of the overlapped piece, where the "local heating" is to be done, so that current passing from one electrode to the other will be localized and concentrated in a path which cuts the joint. Benardos describes various materials from which to make the electrodes. Preferably, they are composed of "refractory material which is also a relatively bad conductor of electricity" and as examples of such materials he refers to graphite and prepared carbon. When carbon electrodes are used in the apparatus shown in Fig. 2 considerable resistance to the current will be met in the electrodes themselves as well as between the electrodes and the surfaces of the plates, and, therefore, heat from the electrodes and heat developed at the surfaces of the plates will pass by conduction to the joint between the plates to heat the same to the required temperature. There will also be resistance in the plates themselves and at the joint between the plates and heat will be additionally developed by the current itself in thus passing from one electrode to the other, which electrodes concentrate the current and the pressure. By thus heating the plates at the joint between them to the welding temperature in small spots or locally, dependent upon the size and shape of the electrodes and by applying pressure to the electrodes which thus localize the pressure, a spot weld will be formed uniting the plates together and surrounded by an extended area of non-welding. Obviously the process can be repeated causing the electrodes to engage at another spot where the sheets overlap and as many welds formed as may be necessary to secure the desired strength. It will be noted so far as I have described the Benardos process that it corresponds precisely with the suggestion of Professor Thomson in his patent No. 496,019, in which the electrodes are faced with carbon (Fig. 7), whereby external heat will be developed and will be carried by conduction to the joint between the surfaces to be secured together. Like Professor Thomson, Benardos also recognized that the process could be carried out in other ways than by principally developing the heat in the electrodes themselves, because he says that the electrodes may be made of magnesium or iridium, both of which metals are good conductors of electricity and which, if used, would result in very much more heat being developed in the plates themselves and at the joints between the plates than when carbon elec-

trodes are used. Furthermore, Benardos says that the electrodes may be made of "carbon with thin metal coatings," which, to my mind, indicates very clearly another example of an electrode which may be used where it is not desired to secure the principal heating effect by conduction from heated electrodes. Benardos had just as clear an appreciation of the problems to be solved as had Thomson. He describes very clearly an apparatus intended for welding thin plates together, and that apparatus will produce and can only produce a localized weld surrounded by an extended area of non-welding. Benardos points out that the weld can be formed by using carbon electrodes in which heat will develop by resistance to the current as well as heat at the point of contact between the electrodes and plates, whereby the heat will principally be caused to reach the spot to be welded by conduction. But he also just as clearly indicates that the electrodes need not be of this character and when a carbon electrode is used that is covered "with thin metal" or when a magnesium electrode is used, or when an iridium electrode is used a condition is presented in which, instead of the heat being principally developed in the electrodes themselves, the heat will be developed within the plates themselves and at the joints between the plates, the current and pressure being concentrated by the electrodes. In ordinary spot welding the usual practice is to weld iron or steel plates by the use of water-cooled copper electrodes. The resistance of the electrodes is usually less than the resistances of the plates, but even under ideal conditions, and even when the copper electrodes are water-cooled they become very hot. Furthermore, the resistance between the electrodes and plates is sometimes more than the resistance of the plates themselves and considerable heat is developed at the point of contact, so that as I have previously said, the electrodes sometimes stick to the plates and they always require retrimming. Sometimes considerable resistance is encountered between the plates themselves, and when this happens the maximum heat may be developed right at the point where the weld is to take place; but at other times the resistance between the plates may be so great that no current flows at all, and then the operator moves on to another point. These are all relative matters. I have made spot welds with iron electrodes and observed that the electrodes become red hot at their points and, of course, are very likely to stick to the work.

According to the text books copper is a considerably better conductor than magnesium, which, in turn, is a better conductor than iron, and all three of these metals are enormously better conductors than carbon. The conductivity of iridium lies about midway between iron and magnesium. If the welding operation is carried on with electrodes which are of higher resistance than the work itself, or if the contact between the electrodes and the work is a higher resistance contact, obviously more heat will have to be carried by conduction to the place of welding than when the conditions are reversed, or, in other words, when the electrodes are of less re-

sistance than the work and where the contact between the electrodes and the work is of low resistance. For the welding or iron or steel plates, therefore, copper electrodes are desirable, because of their low resistance and because they make good contacts with the plates.

If carbon electrodes are coated with copper they can be used successfully for the welding of iron or steel plates and I am very confident that iridium electrodes could also be used for the purpose, since iridium is a good conductor, it has an extremely high melting point, and it is practically non-oxidizable, so that it will make good contact. In fact iridium is used in the electrical arts for the making of contact points, owing to the difficulty with which it is oxidized. I am not so sure of magnesium, but I believe magnesium electrodes could be used for the welding of plates of metal of low melting points.

The form of apparatus shown by Benardos in his German patent, particularly in Fig. 2 thereof, if provided with carbon electrodes coated with thin metal, or with iridium electrodes of the form and relative size shown in this patent, and supplied with the proper current, could, in my opinion, be successfully used as described by Benardos for producing successful welds of limited area in the overlapped portions of iron sheets. These welds would not be distinguishable in any way from welds made with copper electrodes. The sheets would be intimately and strongly connected together by as many welds as might be formed, each of a small size, and surrounded by areas of non-welding. The backs of the plates would not be affected any more than when copper electrodes were used, i. e., there would be a local discolorization, due to heat, and possibly a slight denting of the metal where the electrodes engaged the same under pressure.

I next direct attention to British patent to Parkinson, No. 14,536 of 1894, showing a further carrying out of the process of resistance welding originally disclosed by Thomson in connection with what the patentee refers to as "glutting wheel spokes and bossing railway wagon and carriage wheel centres," although the patentee states generally that the invention—

> "is designed to provide an apparatus for welding metal by means of electric currents passed through the articles to raise them to welding heat." (Complete specification, page 1, lines 21-23.)

The Parkinson apparatus appears to be a highly organized machine, but I will not describe the same in detail, but only so much thereof as relates to the welding of the so-called "glut pieces" in position by a process in which there is a concentration of current and pressure by means of an electrode. Referring to Fig. 3 it will be observed that the wheel is composed of a series of segments each formed of a bar bent in triangular shape, so that each spoke will be composed of a double thickness of metal. The thickness of these bars is shown in Fig. 3 and their relative width in Fig. 4, at C.

When these segments are arranged to constitute a wheel, as shown in Fig. 3, an angular recess will be formed in the circumference coincident with each of the double spokes, and the patentee proposes to fill each of these recesses with an angular shaped glut piece C", serving not only when rigidly secured in place to fill the recesses, but also to complete the circumference of the wheel and furthermore to stiffen and strengthen the wheel at the circumference. These glut pieces are made of metal and naturally would be of the same metal as the wheel itself, namely, iron or steel. The patentee proposes to weld these glut pieces in position by a process of electric welding in which advantage is taken of the resistance of the work as well as the resistance of the joint to secure the welding heat, the current in the work being concentrated so as to localize the heat by means of a more or less pointed electrode. These are the "contact arms" L shown in the patent and particularly in Fig. 3. Since it is necessary that there shall be two welds to hold the triangular glut pieces in position, there are two of these contact arms L co-operating with each glut piece, each contact arm or electrode tightly pressing against the metal of the wheel opposite to the glut piece so as to concentrate the heat and pressure therein. Engaging the outer face of each glut piece is a flat contact block M operated by a hydraulic ram so as to secure the desired pressure. Two dies are carried by the piston of the hydraulic cylinder and engage the sides of the glut piece, as shown in Fig. 4. In operation, when the contact piece M is forced by hydraulic pressure against the glut piece, the two contact arms or electrodes L will be pressed on the inside of the wheel opposite the glut piece, so that when heating current is applied it will flow from each electrode L through the metal of the wheel, past the joint between the same and glut piece and through the glut piece to the contact piece M. Each electrode L, therefore, feeds the current into the work in a limited area, and the current is, therefore, concentrated or localized by the electrodes, so as to heat the metal at the joints and within a localized area to the welding temperature, whereby, under the hydraulic pressure, a limited isolated weld will be formed between each wheel segment and one of the glut pieces, which welds will be surrounded by extended areas of non-welding. This patent, therefore, discloses a further field of usefulness to which resistance welding may be applied, namely, for the manufacture of railway or other wheels, it utilizes the same resistance principle originally disclosed by Professor Thomson, in which the resistance of the work is depended upon to secure the heating effect, the current is localized and pressure is localized by means of an electrode of limited area, whereby the heating current is confined to a restricted path which cuts the joint and in this way the heating effect is localized or restricted, whereby the metal at the joint within a limited area will be brought to the welding temperature so that when pressure is applied between the parts an isolated weld will be secured, surrounded by areas of non-welding.

I next refer to British patent to de Ferranti No. 11,921 of 1903, application for which was filed May 25, 1903, describing still another field of usefulness to which resistance welding may be applied, namely, the welding of turbine blades to the disks, drums or the like which carry them. Referring to Fig. 2, for instance, the disk or drum is shown as being provided with two sets of intersecting grooves *e* which result in the formation of a series of points or projections rectangular in cross section. The turbine blades *d* are now placed in position radially and when heating current is passed through the blades, the current will be concentrated by so much and so many of the projections as may make contact with the engaging surface of the blade, and by means of these projections the current will be concentrated so that the projections themselves as well as those parts of the blade surface as may contact with the projections will be brought to the welding temperature, whereby when pressure is applied a series of separate isolated welds will be formed surrounded by areas of non-welding. In Figs. 3 and 3a the same general principle is applied, except that the current is concentrated at the weld by forming the disk with two circumferential and parallel ribs, whereby two isolated welds will be formed to hold each blade in place. In Fig. 9a three of such ribs are shown, resulting in the formation of three isolated welds, and in Fig. 6 the face of the disk is bored with closely arranged holes *h* whereby the current will be localized by the metal between the holes, and the resulting welds will be surrounded by areas of non-welding.

Adjourned until Wednesday, July 24th, 1918, at 9:30 A. M.

Wednesday, July 24, 1918.

Met pursuant to adjournment.

Present: Same as before.

The references which I have made to the prior art, therefore, show the application of resistance welding for the joining of wires and rods of varying dimensions end to end and side to side, chain making, ring making, repairing drills, attaching handles to knives, making valves, welding plates and sheets of varying thicknesses, some very thin indeed, riveting and soldering of thin plates of sheet metal, general metal working such as might be carried out by a blacksmith, the making of railway and carriage wheels, the making of wire fence, the welding of girders to rails, welding splice bars and fish plates to rails and attaching turbine blades. Of course this does not by any means complete the uses to which resistance welding has been applied. In many lines of manufacture, such as the making of agricultural instruments, typewriters, bicycles and automobiles, resistance welding is extensively used.

(By Mr. Arvedson: The introduction of the following patents and testimony in regard to them is objected to since no one of these patents has been set up as defense in the answer:

United States Patents.

647,694, April 17, 1900, Burton

521,197, Dec. 18, 1894, Lemp

German Patent.

50909, issued Feb. 19, 1890, to Benardos

British Patent.

14536 of 1894 to Parkinson.

(The reference to the testimony of Mr. Waterman in some other litigation and the comments generally upon other litigation matters connected therewith are objected to as utterly immaterial, irrelevant and incompetent.)

(By Mr. Church: Counsel for defendant here gives notice that formal application will be made, in due course, for the amendment of defendant's answer to include the patents objected to as not already set up in the original answer.)

Q. 6. In your answer to Q. 4 you refer to the practice of arc welding. Can you refer to an early patent exemplifying an application of this sort of electric welding?

A. Yes, I refer to United States patent to Benardos and Olszewski, No. 363,320, dated May 17, 1887.

Q. 7. Have you examined and do you understand the Harmatta patent in suit, No. 1,046,066, dated December 3, 1912, the application for which was filed December 3, 1903?

A. I have and do.

Q. 8. Have you examined and are you familiar with the file wrapper and contents of the said Harmatta patent and particularly the original specification, claims and drawings of Harmatta, shown therein?

A. Yes, sir.

Q. 9. I hand you what purports to be a printed copy and what I believe to be a line copy of the original application of Harmatta as filed December 3, 1903, and ask you to state whether or not it is a faithful copy of the original found in the file wrapper of the Harmatta patent in question?

A. It is.

Q. 10. Will you please state to what you find the original application of Harmatta relates?

A. The original application states that the invention

> "relates to a process of and apparatus for manufacturing metal articles of all kinds, in particular those of the thinnest sheet metal, by direct electric welding."

Q. 11. Will you please describe the apparatus shown in this original disclosure and the described mode of using the same?

A. The original Harmatta application describes two forms of apparatus, one by which—

> "continuous welding may be undertaken, that is to say an uninterrupted welded seam made,"

and the other by which—

> "to weld, for instance, sheets of metal only at particular places."

The first form of apparatus is shown in original Figs. 2 and 3, and its application to the welding of a hollow or tubular article is shown in original Fig. 4. This apparatus comprises two arms or conductors c, d, in the lower of which arms is mounted a roller electrode *h*. The upper roller electrode *g* is mounted in a forked member *e* capable of vertical movement with respect to the upper conductor *c* whereby the upper roller electrode *g* may be moved down to press the work between the two electrodes, or moved upwards away from the work. This vertical movement of the upper electrode *g* is effected by a pinion *p* actuated by a lever *r* and engaging a toothed rack *n* cut in the shank of the forked member *e*. In order to rotate the upper roller electrode *g* Harmatta employed a hand wheel *l* driving the shaft of said electrode through gears m, k. Harmatta also shows a bevel gear on the shaft of the roller electrode—

> "should it be desired to automatically advance the object being welded by means of motor power."

The operation of this apparatus was thus described:

> "If now the ends of the object to be welded are introduced between the two roller electrodes g, h, and the circuit closed, continuous welding may be undertaken, that is to say an uninterrupted welded seam made, whereby the upper rotary roller electrode *g* may be pressed with any required degree of pressure upon the lower stationary (or rotary) roller electrode *h* so that the two ends of the material to be welded are firmly connected with each other."

Having thus described an apparatus designed and intended for the making of uninterrupted welded seams, Harmatta then points out that the same process can be used when—

> "it is required to weld, for instance, sheets of metal only at particular places."

For this purpose the modified apparatus shown in Fig. 5 "may be advantageously employed." With this apparatus there are two

It will not be necessary for me to review the prior art, but I have already referred to many instances in which "direct electric welding pressure" has clearly and indisputably "been exercised by means of electrodes located in the direction of the current directly above the surface or point being welded." And of course the history of the Harmatta application shows that he was mistaken.

Q. 13. As one skilled in the art of electric welding what inference, if any, would you draw as to the relative breadth of conception of Harmatta and Benardos (as disclosed in the Benardos German patent) from the fact that Harmatta says nothing about the material of his electrodes, while Bernardos describes his electrodes as being constructed of different materials, varying largely in conductivity?

A. I should say that the conception of Benardos was distinctly more comprehensive than that of Harmatta. All that Harmatta clearly proposes is that pressure "at the place at which welding is to be done" may be applied by one or both of the electrodes, whether the electrodes be rollers or pins. As to practically everything else, except matters of mechanical construction, Harmatta was wholly silent. Benardos, however, not only fully and clearly comprehended within his conception the welding together of thin sheets, either by continuous welds or by local welds, but he also within that conception comprehended the application of pressure at the point where welding is done, in some cases by one electrode and in other cases by both electrodes, and furthermore, that conception comprehended electrodes within which most of the heat would be developed, so as to be carried by conduction to the welding point as well as electrodes of good conductivity whereby most of the heat will be developed within the plates themselves and at the joint between the plates, and finally that conception of Benardos comprehended the application of heat to the plates from heated electrodes, the path of the current being confined to the electrodes and not including the plates. In fact, I should say that the Benardos German patent was a very clear and complete exposition of the art of welding thin plates together electrically.

Q. 14. If the apparatus shown in Figs. 1 and 5 of the drawing of the original application of Harmatta were employed for welding thin metal plates together by the use of a competent electric current and the electrodes provided were of carbon coated with metal, could effective resistance welding otherwise known as local or spot welding be accomplished?

A. Yes.

Q. 15. And suppose, instead of employing electrodes of carbon coated with metal, iridium electrodes were employed, what would be the result?

A. The same spot weld.

Q. 16. And suppose tungsten electrodes were employed, what would be the result?

A. The same spot weld.

Q. 17. And suppose carbon electrodes were employed, uncoated with metal, what would be the result?

A. The same spot weld, although there would be the likelihood of slightly roughening the plates where the carbon electrodes made contact.

Q. 18. On the other hand, suppose that in the apparatus shown in Fig. 2 of the Benardos German patent electrodes of carbon coated with metal were employed for applying current and pressure to superposed thin metal plates, what would result?

A. The apparatus of Fig. 2 of the Benardos German patent to all intents and purposes is identical with the apparatus of Fig. 5 of the original Harmatta disclosure and under the assumption of your question the result would be the same, namely, a spot weld between the plates.

Q. 19. Would the result be any different if the electrodes in the case supposed were of tungsten or iridium or copper or other material more highly conductive than that of the metal plates to be united?

A. The results would be the same.

Q. 20. How does the form of the contacting surfaces of the electrodes shown, for instance, in Figs. 1, 5 and 6 of the original application of Harmatta compare with the form of electrodes shown in Fig. 2, for instance, of the Benardos German patent?

A. In the Benardos German patent the contacting area is a small square. With the electrodes of Figs. 1 and 5 of the original Harmatta disclosure the area of contact appears to be a very small dot or circle. With the form of electrodes shown at the left of Fig. 6 of the original Harmatta disclosure, the area of contact is in the form of two parallel lines. With the form of electrode shown at the right of Fig. 6 of the original Harmatta disclosure, assuming that these electrodes are rounded, as they appear to be, the area of contact would be a point.

Q. 21. Professor Thomson, when examined as a witness in this case, was put this question:

> "Q. 90. Tungsten being of relatively higher conductivity would answer well and might be used were it not so expensive. Am I right about this?"

and he answered:

> "A. Yes, I have known of its being used in special ways and in special cases and with considerable success."

Do you or do you not agree with Professor Thomson as to the availability of tungsten for electrodes in so-called spot welding machines?

A. I agree with him.

Q. 22. Professor Thomson was also asked these questions:

> "Q. 91. How about iridium? Might not that be used but for its high cost?
>
> A. It is not as good a conductor as you could wish and the cost is about $175 an ounce.
>
> Q. 92. But you think it might answer for an electrode for a spot welding machine if the cost were not too high?
>
> A. It might if it did not have so high a resistance which would waste energy. I don't think anybody is likely to try it."

I ask you if iridium might not be used effectively as an electrode or electrodes in a spot welding machine and also to tell us what the relative resistances or conductivity of iridium and tungsten are?

A. Iridium electrodes could be effectively used for this purpose. The text books place the conductivity of iridium and tungsten between iron and copper, tungsten being of somewhat better conductivity than iridium.

Q. 23. Is the resistance of iridium less or greater than that of iron?

A. Less.

Q. 24. Is the conductivity of iridium greater or less than that of iron?

A. Greater.

Q. 25. Given two superposed thin iron or steel plates to be united or welded together by the heat generated by the resistance to the electric current passed through the plates by electrodes which also apply pressure at the point where the current passes, what determines whether the heat is developed in the electrodes themselves, at the points of contact between the electrodes and the plates, in the plates themselves, or at the contact surfaces between the plates?

A. The resistance to the current at the points mentioned. If the resistance is doubled, for example, and the current remains the same, the heat will be doubled. If the current is doubled, and the resistance remains the same there will be four times the heat. Of course, these are all variable factors. Sometimes the resistance between the electrodes and plates may be greater than the resistance of the plates including the joint between the plates, and at other times the resistance of the plates may be greater than the resistance between the electrodes and plates. The thing to do in welding is to get

enough heat between the surfaces to be welded to bring those surfaces to the welding temperature.

Q. 26. And in how many ways may this be done?

A. I should say the ideal condition would be such as to generate as much heat as possible at the joint between the plates so as to localize the heat as much as possible at the places to be welded and to develop as little heat as possible elsewhere in the circuit. This would mean using electrodes of high conductivity and of as large cross section as possible (except at the point of contact) and properly water-cooled, and having the point of contact with the plates just as perfect as possible, for instance, by solder, and employing sufficient current to form the welds very quickly, so as to reduce loss by radiation and conduction. But, of course, this ideal condition is not realized and much heat is likely to be developed at the outer surface of the plates so that, as I have said, the electrodes sometimes stick to the plates and they tend to disintegrate and roughen at the point of contact, so that every once in a while they must be retrimmed by filing.

Q. 27. In the Thomson patents 347,140 and 347,141, at what point is the resistance to the passage of the welding current relied upon to produce the heat necessary for welding?

A. In the metals themselves through their resistance and at the joint where the metals abut. In the actual operation of butt welding machines when two pieces are welded together end to end, the weld appears to be a progressive one proceeding very rapidly after sparking stops.

Q. 29. In the Thomson patent No. 396,015, which has been referred to as the riveting patent, at what point is the resistance to the passage of the electric current relied upon to produce the heat to effect the welding of the plates shown before union in Fig. 10 of the patent, and after union, in Fig. 7 of the patent?

A. In the plates themselves and at the joint between the plates in line and coincident with the concentrated current passing from one electrode to the other electrode.

Q. 29. In the Thomson patent No. 444,928, at what point is the resistance to the passage of the current relied upon to produce the welding heat?

A. In the plates themselves and at the joint between the plates in the path of the current concentrated by the two electrodes.

Q. 30. I ask you the same question with respect to the Lemp patent 553,923, having special reference to Figs. 1 and 2?

A. With this patent, in which as I have previously stated, the current is concentrated by the electrodes and the heating effect relied upon to secure the weld is due to the resistance of the plates as well as the joint between the plates.

Q. 31. In the Thomson patent No. 496,019, at what point does the resistance to the passage of the current produce the

welding heat, having reference particularly to the apparatus shown in Fig. 6 of that patent?

A. The heat results from the resistance to the passage of the current offered by the two sheet metal pieces as well as the joint between them.

Q. 32. How as to the modification of the apparatus of this patent No. 496,019 shown in Fig. 7, where the electrodes are faced with carbon?

A. Here most of the heat would be developed in the electrodes themselves and at the point of contact between the electrodes and plates and would be carried by conduction to the joint between the plates.

Q. 33. In the Robinson patent 574,942, where is the resistance to the passage of the electric current relied upon to produce the welding heat?

A. In the case of a girder bar shown in Figs. 1, 2 and 3, the current is concentrated or confined by the projections or contact points *d*, which, therefore, because of their high resistance, become highly heated, and heat is also developed at the points of contact between said projections and the rail. With the splice bar, shown in Fig. 11 for example, the current is concentrated by the projections *i*, and also at the points of contact between said projections and the rail, and by reason of this concentration said projections and the surfaces with which they contact are brought to the welding temperature.

Q. 34. Same question as to the patent of Kleinschmidt. Where in the device of that patent is the resistance to the passage of the current relied upon to raise the parts to be joined to welding temperature?

A. In the bosses *b* and points of contact between said bosses and the rail, whereby the current is concentrated and the heating effect is obtained.

Q. 35. In the Perry patent No. 670,808, where is the resistance to the passage of the electric current relied upon to produce the welding heat?

A. At the point of contact between the crossed wires where the current is concentrated and raises the metal to the welding temperature.

Q. 36. Where in the case of the balls or spheres shown in Figs. 6 and 7 of this Perry patent?

A. At the point where they contact and the current is thus concentrated.

Q. 37. In the case of the de Ferranti British patent, at what point does the resistance to the passage of the welding current raise the parts to the welding heat?

A. In Fig. 2, wherever one of the small projections makes contact with the turbine blade current will be concentrated thereby and heat will be produced in the projection and at the

point of contact between it and the blade, thus securing the welding heat.

Q. 38. In the Burton patent 647,694, where is the resistance to the passage of the electric current relied upon to produce the welding heat?

A. In the plates themselves and in the joint between the plates.

Q. 39. The Burton patent specifically mentions wheel tires as articles to be welded, does it not?

A. Yes.

Q. 40. Wheel tires are made of relatively thin metal, are they not.

A. Yes.

(By Mr. Arvedson: Question objected to.)

Q. 41. What has been your observation as to the thickness of metal wheel tires?

A. That depends of course upon the size of the wheel and the desired load it shall carry, but I have seen tires the thickness of the metal of which is certainly not greater than one sixteenth of an inch, and of course with very heavy wheels I have seen metal as thick as three-eighths of an inch or more.

Q. 42. The Burton patent speaks of the advantages of a lap welded joint. It shows in Fig. 13 means for applying rivets by an electrical welding process to such lap welded joints, does it not?

A. It does.

Q. 43. Now, in that form of apparatus shown in Fig. 13, what do you understand to be the electrodes?

A. The bed electrode 100 which has a recess therein to receive the rivet head and the movable electrode 210.

Q. 44. How do you understand this rivet is applied? Give us your understanding as to how the securing of this overlapped joint of Fig. 13 is effected.

A. I would understand that with the arrangement of Fig. 13 the rivet was provided with a head similar to that shown in contact with the top plate over which the upper electrode fitted, so that when the rivet was pressed upon by the electrode and the circuit was closed so that as current would flow through the rivet, the latter would be brought to the welding temperature and the head on the lower end swaged by reason of the cavity in the bed electrode. If, however, the head of the rivet was formed on the bottom, then the recess in the upper electrode working on the hot metal would form a head on the rivet, as shown. If a rivet blank were used, then both heads would be formed during the process of riveting. All of these operations being fully explained in the Thomson riveting patent. Whichever way the head of the rivet may be formed in the

Burton apparatus, the current will first be concentrated in the rivet blank to heat the rivet and after the rivet has been headed to that the plates themselves will be squeezed between the two electrodes, current will be permitted to flow between the electrodes so as to be concentrated by the same and by reason of the resistance of the work and of the joint between the plates a weld will be formed. Of course, Burton, as I have said, contemplated making these welds without necessarily performing a riveting operation, as he explains in paragraph commencing line 67, page 2.

Q. 45. What means are provided in the Burton patent for upsetting the rivet where a rivet is used and for clamping the overlapped parts of metal between the electrodes?

A. The rivet is upset or headed by one or both of the electrodes, both of which are suitably recessed for this purpose. The work is clamped or held by pressing downward on the upper electrode through the foot lever 180, and this not only applies pressure between the parts but also closes the electrical circuit, so that the current flows.

Q. 46. Turning, now, to the form of electrode shown at 240 in Fig. 1 of this Burton patent, how does the contact surface of this electrode compare with the contact surface of the electrodes shown in Harmatta's original disclosure?

A. It is practically identical with the form of electrode shown at the right, Fig. 6.

Q. 47. Suppose, now, we are dealing with the apparatus of the Burton patent and are desirous of electrically welding the overlapped ends of a metallic tire by means of the proper bed plate 100 and the form of movable electrode having the spherical end 240. Please state how you would proceed under the disclosure of the patent to effect this welding operation and the characteristics of the weld that would result?

A. In the first place, as stated by Burton, I would place the pieces "to be lap welded" on the bed electrode 100 "with their ends overlapping" (page 2, lines 68-69); then I would select the electrode 240 which is "one of the electrodes of the electrode head" (page 2, lines 70-71); then I would depress the foot lever (page 2, line 70) so as to bring that electrode "into contact with the work" (page 2, line 72). In this way, "the circuit is closed and the current passes through the work in transverse direction across the overlapping ends of the parts to be heated" (page 2, lines 73-76). "As soon as the piece is heated to the proper temperature" (page 2, lines 78-79), which I would know by inspection, I would then release the foot lever (line 81) and the spring 170 would then elevate "the upper electrode out of contact with the work, whereby the circuit is broken" (lines 83-85). In this way I would have made a spot weld between the overlapped parts and if desired I could hammer the joint or otherwise finish it. I know a

spot weld would be formed in this way, because the electrodes would concentrate the current in a restricted path, and by reason of the resistance of the work and the resistance of the joint the metal would be heated at the joint to the welding temperature in a limited area. Pressure would be applied to the electrode because when the electrode is pressed down with the foot it is impossible to avoid applying pressure. The weld so formed would be an isolated weld of small area due to the concentration of the current and it would be surrounded by an extended area of non-welding. Furthermore, as pointed out by Burton, there would be "no upsetting of the metal and no formation of a bulge or projection at the joint" (page 1, lines 18-20). In other words, the weld would be concealed within the joint between the overlapped pieces.

Q. 48. In ordinary spot welding machines such as used by the defendant the pressure applied to the movable electrode is transmitted through a yielding spring is it not?

A. It is.

Q. 49. How much pressure is required to spot weld, according to your experience with such a machine?

A. I am unable to give any figures, but not much pressure is required for ordinary sheet metal because I have frequently placed my hand between the electrodes and brought them down without any painful pinching.

Q. 50. Brought them down how?

A. Forced the foot lever down as far as it would go so that my hand was squeezed between the two electrodes.

Q. 51. To what extent?

A. I operated the machine in the usual way, bringing the foot lever down as far as it would go and depressing the spring more than would be done in actual practice, because the thickness of my hand is many times more than the thickness of the plates. I made most of my experiments with plates about .020 inch in thickness.

Q. 52. Something has been said by the witness Gravell and by Professor Thomson as to the actual advantages that flow from the employment of tapered electrodes in electric resistance or spot welding machines. Can you point to instances in the prior art, that is to say, in the art that existed prior to 1903, of the use of such tapered electrodes?

A. By tapering electrodes the current is concentrated and caused to follow a path of smaller cross section than when the electrodes are not tapered. This tapering of the electrodes for this purpose is shown very clearly in the Lemp patent No. 531,197, to which I have referred (See Fig. 3). It is also shown in Thomson patent No. 396,015 (See for instance electrode K, Fig. 9). A roller electrode is the same as a tapered electrode because it concentrates the current in the same way (See Thomson patent No. 444,928). Tapered electrodes are also shown in

Thomson patent No. 496,019 (See C, C', Fig. 1). The Lemp patent No. 553,923 shows roller electrodes, and in Fig. 2, these electrodes are tapered, and, of course, the curvature of their circumference is also equivalent to a taper. The Robinson patent No. 574,942 does not show electrodes for concentrating the current, but the projections *i'* Fig. 12, are clearly shown as tapering for the purpose of concentrating the current and heating effect, where these projections make contact with the rail. The Burton patent No. 647,694 shows two tapered electrodes in Fig. 1, namely the electrodes 240 and 250. The two crossed wires in the Perry patent No. 670,808 are tapered or reduced in area at the meeting faces to concentrate the current, and the same is true when two spheres are welded together as shown in Fig. 6. The Rietzel patent No. 928,701, in Figs. 1 and 2 shows that the projections are tapered for the purpose of concentrating the current and heat at the points of contact. The Benardos German patent, No. 50909, clearly shows tapered electrodes (See Fig. 2). And, finally, the Parkinson patent illustrates the contact pieces L as being tapered to thus concentrate the current and localize the welding.

Q. 53. I gather from the testimony of Mr. Gravell, plaintiff's expert, that his idea is that in making a spot weld, so-called, the area of the welded portion is limited and circumscribed to the area of the contacting portions of the opposed electrodes through which current and pressure are applied. Do you or not agree with Mr. Gravell as to this?

A. I think that Mr. Gravell correctly describes spot welding as it is often carried out where the plates themselves are in contact throughout an extended area and where the current itself would be truly concentrated by the electrodes, and the resulting weld would therefore depend upon the area of contact between the electrodes and plates. But, in other cases, I think that the electrodes themselves tend to pinch the plates or buckle them outwards so as to form points which meet, at which points the welding heat would be developed.

Q. 54. Do you or not think that the area of weld is precisely coincident with the area of pressure of the electrodes, or only substantially so?

A. I think it is only substantially so.

Q. 55. Give your reason for so thinking?

A. In the first place, I have made many welds with the same electrodes, pulled those welds apart, and did not observe that they were always precisely the same size, and then I think the time element is important, and if sufficient time is given the weld is generally larger and a better weld than when too little time is given. My observation is that while I believe the area of welding is substantially determined by the area of contact of the electrodes it is not mathematically certain that the weld

will be precisely equal, either to the area of contact or the pressure.

Q. 56. State whether or not work characterized by the absence of extrusion of metal referred to by Mr. Gravell in his testimony, is the same as or different from the quality of the work produced by Burton and referred to in the Burton patent, (Page 1, lines 17 et seq.)?

A. Of course, with a spot weld or any other kind of a weld formed between two flat surfaces and circumscribed by areas of non-welding extrusion of metal is not apparent or observable, but this does not mean that there is none. Moreover, in spot welding there is frequently metal extruded at the back of the plate, but to the extent that extrusion is concealed by the very fact that the weld is concealed Mr. Burton made identically the same observation that Mr. Gravel refers to when he says that

> "consequently there is no upsetting of the metal and no formation of a bulge or projection at the joint." (Page 1, lines 17-20).

Q. 57. You have read, have you not, the depositions given by Mr. Gravell and by Professor Thomson, in this case?

A. I have.

Q. 58. And you have examined, have your not, the muffler tube offered in evidence as of defendant's manufacture, marked "Plaintiff's Exhibit No. 2"?

A. Yes.

Q. 59. And do you recall that that exhibit shows a number of weldings at different points of the overlapped portions, some of which are remote from the edges of the overlapped portions and some of which are at the very edges thereof, the former being entirely surrounded by unwelded portions of the metal and the latter only partially surrounded by such unwelded portions? Is there any distinction in principle between the making of these several welds by the same machine.

A. None, in the world, that I can see. I have frequently watched workmen at the Ford Plant making these muffler shells and they followed precisely the same procedure, no matter where the weld was located with respect to the joint. In every case the current and pressure were concentrated by the electrodes and a weld was thus formed.

Q. 60. And do you draw any distinction, or may any distinction be properly drawn between a weld made by such an apparatus, whether it be wholly or partially surrounded by unwelded portions of the metal?

A. Possibly a weld formed entirely within the joint would look a little neater, but so far as the weld is concerned, I do not see the slightest difference between the two.

Q. 61. Mr. Gravell, as I understand him, attempts to make a distinction between what he calls a spot weld and what he calls a line weld. I would ask you if there is any real distinction between the two?

A. I do not see the slightest distinction between the two. They are both made with the same process, current and pressure being concentrated by the electrodes in each case. When a spot weld is formed the current traverses a single path and heats the metal between the plates in that path to the welding temperature, and the weld is thus made. In making a so-called line weld, we first make a spot weld, that is to say, the electrodes are brought in contact with the work to concentrate the current and pressure and bring the surfaces of the metal of the two plates to welding temperature and we then apply pressure to the electrodes to cause the metal to coalesce. Then having made that spot weld we move the plates with respect to the roller electrodes, the movement being such that a continuous weld is formed, but at each point in the travel of the plates the same identical process is being performed, or, in other words, the current is being concentrated by the electrodes, the surfaces rise to the welding temperature, and the pressure consolidates the weld. Even when making so-called spot welds the workman sometimes gives to the pieces under treatment a slight oscillating motion, causing the work to roll slightly with respect to the electrodes, and making the weld somewhat longer than it otherwise would be. The Thomson patent No. 444,928 shows in Fig. 2 an arrangement in which the length of the weld is limited by the circumference of the segments. If the electrode of an ordinary spot welding machine were made loose, so as to oscillate like a toggle, they would make the same kind of a weld.

Q. 62. What do you find, if anything, in the disclosure of Harmatta's original application as to any distinction between the welds made by roller electrodes?

A. I don't find that he made any distinction at all. After describing the process of making continuous or uninterrupted welds he says that:

> "If it is required to weld, for instance, sheets of metal only at particular places, the apparatus shown in Fig. 5 may be advantageously employed."

To my mind this means that we do not change the process, but simply change the apparatus. I also call attention to the fact that Harmatta in his original disclosure, referring to Fig. 3, uses the expression "advancing series of single points of the seam to be welded", thus showing that in fact a seam weld is practically a multiplicity of single welds.

Q. 63. If the roller electrodes of Thomson or of Lemp or of Harmatta's original disclosure are squeezed down upon overlapped sheets of metal and current passed through and the pressure is

removed after the weld has been made, would or would not such weld be surrounded by an area of no weld?

A. The weld would be surrounded entirely by an area of non-welding.

Q. 64. Suppose, now, the rollers or the work were manipulated so as to make a line of welding, say a quarter of an inch or an inch long, would such an elongated weld be a spot weld and surrounded by an area of no weld?

A. It would be.

Q. 65. Could you tell from an examination of a weld an eighth of an inch wide and a quarter of an inch long whether it was made by electrodes an eight of an inch wide and a quarter of an inch long, or produced by roller electrodes an eighth of an inch wide that had been moved so as to produce a weld a quarter of an inch long? In other words, would the resulting product in the two cases supposed be substantially the same or substantially different?

A. They would be the same. Of course, in one case, more current would be required, and in the other case more time.

Q. 66. Is, or is it not, practicable to unite overlapped sheets of metal by roller electrodes in accordance with what you have termed the electric resistance process?

A. Yes, I consider the process as highly feasible.

Q. 67. And by such process can you produce a continuous weld or a continuous seam.

A. Yes.

Q. 68. Professor Thomson, in his testimony, has indicated that in the spot welding of very thin sheets of metal the effect of the electrodes is to pinch the flexible sheets so as to cause them to crown as it were at the point of pressure, and thus project the parts of the sheets at the point of pressure beyond the surface of the unpressed portion of the sheets. Do you agree with him that this may be the result of the action of the electrodes on thin flexible sheets of metal?

A. Yes, I think that is a reasonable assumption, and in fact I have observed the same thing myself.

Q. 69. Have you any illustration or photograph of work tending to exemplify this idea?

A. Yes, I here produce six photographs illustrating the manufacture of mufflers at the Ford Plant and showing particularly the spot welder employed for welding the overlapped seam of the interior shell. These Ford mufflers are made of three shells nested together or one within the other, and the first photograph I produce shows the shells before they have been assembled. This photograph is marked "A-1". It will be noted that the outer and intermediate shells are provided with interlocking lapped joints, and the only effect of the welding is to consolidate the metal at the welding spots to make the joint a little stronger and to prevent rattling. As is well known explosions frequently take place in mufflers and spot welding is too uncertain to be relied upon for the entire strength of the joints of these larger shells. In fact,

it is the rule of the Ford Company never to spot weld the parts on which a man's life may depend or where absolute certainty is necessary. The next photograph, marked "A-2", shows the same parts after welding. It will be noted that every one of the four welds on the inner shell overlap the joint so as to squeeze out the metal or cause it to extrude. This is the common thing in making these shells, as the workman operates very rapidly and the easiest line for his eye to follow is the side of the overlapped edge. The welds formed on the intermediate shell also show extrusion, and this also is the customary practice. By exercising care the workman could always locate the welds in the overlapped seams, but he is in too much of a hurry to do this and forms the welds in the seam wherever the electrode may strike. So far as the strength of the joint is concerned, it makes no real difference whether the weld is slightly off center or not. The work shown on the outer shell is more carefully done because some degree of neatness is desirable with this part which is exposed, but one of these welds plainly shows the extrusion of metal. In the next photograph marked "A-3" is shown the spot welder used for welding the interior muffler shell at the Ford Plant, a pair of clamping jaws being provided surrounding the lower electrode arm for bringing together into overlapping position the metal to be welded. The lever which extends up past the upper electrode is a hand lever to operate the clamping jaws. The next photograph, marked "A-4", shows the interior muffler shell in position to receive the first weld, the clamping jaws holding it rigidly and holding the edges overlapped to the desired extent. The next photograph, marked "A-5", shows the muffler shell receiving its second weld. In this photograph, it will be noted, very clearly illustrates the effect referred to by Professor Thomson; in other words, the upper electrode pinches the metal at the joint together so as to localize the current and pressure. The natural spring of the metal between the two welds has forced the two sheets apart. And, the final photograph, marked "A-6", shows the interior muffler tube with the last weld finished and with the jaws open so that the tube can be pulled off. Here also the effect referred to by Professor Thomson is very clearly illustrated, the metal being pinched or squeezed together by the electrodes to thus concentrate the current and pressure. Photographs "A-5" and "A-6" also very clearly illustrate the thinning of the sheets, due to the pressure of the electrodes on the plastic metal, resulting in extrusion thereof, to which I have referred.

Q. 70. State whether or not there is any difference in principle between a method of welding flexible sheets of metal wherein the sheets are first struck up so as to form contacting surfaces to be welded and are then placed between electrodes which localize and pass current at such struck up places, and a method of welding in which flexible plates are struck up by the electrodes themselves so as to form the projecting surfaces to be welded and then are subjected to pressure and current at such surfaces?

A. No, I should say that the processes are identical. In one, struck up projections could be formed as a preliminary operation, and after being formed would concentrate the current and pressure as I have explained, for instance, as suggested by Robinson. In the other, the electrode itself would serve practically as a die to form a projection and the two projections thus formed abutting together would concentrate the heat and current in precisely the same way.

Q. 71. State whether or not there is any substantial difference between the products of the methods or processes set forth in the last question?

A. Not if a substantially pointed electrode were used in each case.

Q. 72. Suppose a substantially pointed electrode were not used in each case, but that the current was localized as well as the pressure at the places of weld by any sort of an electrode, would or would not the products be substantially the same?

A. Of course the product in each case would be substantially the same, but the point I had in mind is illustrated very clearly in the two photographs "A-5" and "A-6", where the metal is shown perceptibly thinner at the welds and bulges up between the welds. I had in mind that if the muffler tube were provided with projections pre-formed in the material and if a flat electrode were used, pressing down along the entire length of the machine, this thinning of the metal might not be so pronounced.

Q. 73. Are you familiar with the practice at defendant's plant, which you call the "Ford Plant", involving the electrical welding of mufflers such as shown in these photographs A-1 to A-6, inclusive, by means of apparatus shown in such photographs?

A. Yes, I spent a week at the Ford plant and frequently witnessed the operation of welding machines for making these mufflers and operated the machines myself, and I also had turned over to me a standard Winfield welder with which I made many experiments.

Q. 74. State whether or not these photographs which you have produced were made by you or under your direction?

A. They were made under my direction from parts representing actual average manufacturing conditions.

By Mr. Arvedson: The testimony of this witness as to the practice of the Ford Company, defendant, is objected to since the witness has not been properly qualified.

Adjourned until 11 A. M., August 5, 1918, at the Office of Fish, Richardson & Neave, 84 State Street, Boston, Mass.

Boston, Mass., August 6, 1918.
1.30 P. M.

Met pursuant to adjournment.

Q. 75. What does Harmatta's original disclosure have to say about extrusion of metal, area of no weld, relatively cold metal surrounding the place of weld, and electrodes of high conductivity?

A. Nothing whatever. On the subject of extrusion, with the apparatus shown in figure 1 of the original Harmatta's drawings, there will be extrusion or upsetting of the metal around the pointed electrodes and possibly also between the plates. With the form of apparatus shown in figure 4 there will be a thinning of the overlapped edges and consequent extrusion as illustrated on the photograph which I produced at Washington of the practice in making Ford mufflers. As to the second point, namely, the area of no weld, I find in the original description no exact description of the same, since for all that appears to the contrary, the welds produced by the apparatus of figure 5 may overlap. Harmatta made no reference in his original disclosure to relatively cold metal surrounding the weld. This depends to a large extent upon the current used and the time occupied in making the weld. If the weld is made very quickly the metal surrounding it will be of lower temperature than when it is made slowly. This is pointed out very clearly in Patent to Perry No. 670808 to which I have referred heretofore. No reference was made in the original Harmatta disclosure to the use of electrodes of relatively high conductivity.

Q. 76. How, if at all, does the process or method of electric welding involving the use of roller electrodes set forth in the disclosure of the original Harmatta application differ from the process or method of electric welding set forth in the Thompson patent No. 444,928?

A. I see no difference whatever between the two. Both the two sheets to be welded are overlapped and with both two roller electrodes compress the overlapped portion of the sheets between them. Assuming that Harmatta intended to use electrodes of good conductivity then in both current is concentrated by the electrodes so as to heat the adjoining surfaces which overlap and bring the same to the welding temperature. On the same assumption in both the pressure of the two electrodes will consolidate and form the weld. In both there will be the preliminary formation of a spot weld and the subsequent formation of an extended weld. In both the pressure applied to the work will cause the softened metal to extrude since it will be noted that Harmatta in original figure 4 shows the electrode coming to the exact edge at the bottom and practically to the exact edge of the plate at the top.

Q. 77. How does the product resulting from the practice of the process or method of electric welding disclosed by the Thompson Patent No. 444928 compare with the product resulting from the practise of the process or method disclosed in the original Harmatta application involving the use of roller electrodes?

A. Assuming that Harmatta intended to use roller electrodes of good conductivity, the product in each case would be the same, namely, two sheets of metal the overlapped edges of which are continuously welded together.

Q. 78. How does the process or method disclosed by the Lemp patent No. 553923 compare with the process or method disclosed in the original Harmatta application involving the use of roller electrodes?

A. The only difference would be that with the apparatus of the Lemp patent there would not be an extrusion of metal as with the Harmatta original disclosure due to the thinning and displacement of the metal thereby practically extending the overlapped portions. With the device of the Lemp patent the roller electrodes work well within the overlapped edges, so as to be surrounded wholly by metal and such extrusion as there may be will be an upsetting of the metal around the electrodes as is frequently noticed with ordinary spot welding, and possibly also a slight extrusion between the plates which however will be concealed as mentioned in the Burton patent.

Q. 79. How does the product of the process or method of the Lemp patent No. 553923 compare generally with the product of the process or method of the original Harmatta application, involving the use of roller electrodes?

A. The product will be the same except that with the Harmatta roller electrode process there will be an observable extrusion at the edges of the plates where they overlap whereas with the product of the Lemp process there will be no such extrusion.

Q. 80. To affect the electric welding of two superposed metal plates at separated spots by means of electrodes which apply and localize both pressure and current, is it or not necessary that the electrodes be of any particular shape or that they be alike or that both of them be movable?

A. No. Electrodes may be of various shapes so long as they are of sufficiently reduced area to properly concentrate the current. It is not necessary that both be movable and in actual practice with all the spot welding machines I have seen only one is movable. It is not necessary that they should be the same. It is not necessary that both should be of reduced area of contact since perfectly good spot welds can be obtained if one of the electrodes is of considerable area. In fact, it is not necessary that there should be two electrodes at all, since spot welding can be made with only a single electrode the work itself practically constituting the other electrode.

Q. 81. Will you explain a little more fully how the work itself may constitute one of the electrodes?

A. If the welding circuit is completed through the work itself, as for example, by having the work contact with one or more plates, when a single electrode is brought down into contact with the work, the current will be concentrated in the immediate neighborhood of the electrode to bring the metal to the welding temperature and that single electrode will supply the pressure to complete the weld.

Q. 82. Recurring to the Burton patent No. 648694 suppose that the parts to be united by welding are the beveled ends of a metal tire band and that a stationary electrode like that marked 100 and an upper movable electrode having a spherical head like that

numbered 240 are employed, what would be the character of the resulting weld or welds?

A. Each weld will be a separated isolated spot weld between the contiguous surfaces of the work resulting from the concentration of current and pressure affected by the electrode 240. Each weld will be surrounded by an area of non-weld. The extent of that area will depend of course upon how many welds were made. Such extrusion of metal as might be formed would appear as an upset where the electrode dug into the metal.

Q. 83. Do you or do you not understand from the disclosure of the Burton patent that the patentee intended in all cases, to hammer the joint at the point or points of weld to complete the union of the parts?

A. No, the hammering operation referred to is an optional one. The patent does not say that this "must" be done, but states that it "may" be done. The patent does not say that the hammering if employed has anything to do with the welding, but that when it is employed it affects the "finish" of the joint. This finishing of the joint the patent says may be affected not only by hammering but "otherwise." If an electrode such as electrode 240 is used there will be more or less upsetting of metal and the joint could be finished by hammering upon this so as to make the surface smoother. If the joint is to be finished in some other way than by hammering as the patentee suggests it might be finished, for example, by filing. It is quite clear to my mind that with the operation as described by Burton the weld is formed by the concentration of current and pressure by the electrode employed, and when the patent says that "the operator may shove the work forward on the anvil" it means, I think, the work as a whole, or in other words, the parts to be joined have in fact been joined.

Q. 84. Do you find any limitation in Burton patent as to the thickness of material that may be electrically welded according to his disclosure?

A. No, I do not.

Q. 85. During your deposition you have referred to the relative conductivity and resistivity of different materials employed as electrodes in electric welding processes. For the convenience of the court will you spread upon the record the table that may be useful for purposes of comparison?

A. The following resistivity figures are obtained from physical tables issued by the Smithsonian Institution in 1916. The figures indicate the resistence in microhms per cubic centimeter at 0 degrees centigrade:

Copper	1.586
Iron	8.85
Iridium	6.1
Magnesium	4.35
Tin	13.0
Platinum	10.96
Silver	1.46
Tungsten	5.57

Converting these figures into those of relative conductivity on a basis of copper as 100, I find the following:

Copper	100
Iron	17.9
Iridium	26
Magnesium	36.2
Tin	12.2
Platinum	14.4
Silver	108
Tungsten	28.8

The order of conductivity therefore of these metals according to the Smithsonian tables is as follows:

Silver
Copper
Magnesium
Tungsten
Iridium
Iron
Platinum
Tin

I did not find in the Smithsonian tables the figures for carbon, but in Standard Hand Book for Electrical Engineers, published in 1915, by McGraw-Hill Book Co., Inc. New York City, the statement is made, Section 4-154 that the average value for carbon, at about 3000 degrees may be taken as 720 and for graphite approximately 812, Microhms per cubic centimeter.

Q. 86. Have you or have you not doubt as to the availability of iridium as an effective electrode material for effecting spot welding of metal plates?

A. I have no doubt at all.

Q. 87. What approximately is the present price of iridium?

A. The nominal price is quoted about $200 per ounce, but it is practically impossible to obtain it.

Q. 88. What was the price of iridium in the years 1889-90?

A. As near as I can tell you from 20 to 40 dollars per ounce.

Cross-examination by MR. STACKPOLE without waiving objections.

X-Q. 89. What is the resistivity of clay?

A. I don't know.

X-Q. 90. Look in the book of Standard Hand Book of Electrical Engineers and see if you can find out?

A. I don't find any clay in the index.

X-Q. 91. How about alumina, which I understand is another name for clay?

A. As I recall it alumina is oxide of aluminum or bauxite. Both of these materials are referred to but no figures are given as to their electrical conductivity or resistivity.

X-Q. 92. Is clay practically a non-conductor?

A. I think it is.

X-Q. 93. Would you call magnesium a good conductor or fair conductor?

A. Assuming the correctness of the Smithsonian Inst. tables, I would call it a fairly good conductor.

X-Q. 94. You wouldn't call it a bad conductor?

A. That depends upon what you use it for. To make a telephone line of magnesium would be poor practice because for that purpose it would be a bad conductor. For spot welding it might be a good conductor.

X-Q. 95. Would you call iridium a good or bad conductor of electricity?

A. The same is true of iridium. It is a good enough conductor to make a spot weld.

X-Q. 96. Could a bad conductor of electricity be made by mixing clay and magnesium?

A. I am not able to say.

X-Q. 97. Could a bad conductor of electricity be made by mixing clay and iridium?

A. That is a very difficult question to answer. If for instance a high tension insulator contained more or less iridium in it, I should say that it would break down on a lower voltage than if it had no metal in it and in that sense it might be considered a conductor.

X-Q. 98. Could a mixture of clay and magnesium be made so that it would have the same conductivity as carbon?

A. I don't know. I never tried it.

X-Q. 99. Could a mixture of clay and iridium be made so that it would have the same bad conductivity as carbon?

A. I don't know. I never tried it. I recall that Mr. Edison about 15 years ago made incandescent lamp filaments out of an earthy oxide with which was mixed metallic particles and he was able in this way to make conductors the resistance of which depended upon the relative proportion of the oxide and those particles. Whether this would throw any light on mixtures of clay and iridium, I don't know.

X-Q. 100. Are you the Frank L. Dyer who testified as an expert witness on behalf of Sebastian Ziani deFeranti in interference between Fernati and the Harmatta patent here in suit on or about November, 1916?

A. I am.

X-Q 101. In that case you testified that you first became directly familiar with spot welding when you were retained in the present case (the interference case) about a month ago,—that would be October, 1916. Is that substantially correct?

A. Yes.

X-Q. 102. Prior to October, 1916, what experience had you had with spot welding?

A. None at all. What I have learned about spot welding has been learned since. I don't consider spot welding a difficult or mysterious or occult thing at all. It is very much simpler than

operating a sewing machine and requires about the intelligence used in applying a notarial seal to two sheets of paper. I consider myself an expert spot welder at the present time, and I have no doubt that I could get a job as a spot welder.

X-Q. 103. Prior to that time, October, 1916, what experience had you with electric butt welding?

A. No practical experience, but of course for many years I have been familiar with the principles and literature relating to butt welding.

X-Q. 104. Since October, 1916, have your investigations into electric welding both butt and spot been largely if not entirely in the interests of those who are now contesting the Harmatta patent in suit?

A. No, sir. I have made a number of inventions relating to both kinds of welding as well as percussion welding on which applications for patents have been filed, that have nothing to do with the present controversy, either directly or indirectly, and I have carried on a very considerable number of experiments in welding of all kinds having no relation whatever to this controversy.

X-Q. 105. Did you make those experiments before or after October, 1916?

A. Afterwards.

X-Q. 106. When did you first begin to investigate the subject of spot welding for those interested in contesting the Harmatta patent in suit?

A. I tried to familiarize myself with some of the principles of spot welding, as I recall it, immediately prior to the time I testified in the interference case to which you have referred. My actual investigation and operation in spot welding machines was sometime afterwards. I should say possibly a year afterwards.

X-Q. 107. Was that investigation made at the instance of those contesting the Harmatta suit?

A. It was made at the request of a Boston attorney who had charge of one or more suits pending in this District on the Harmatta patents. The attorney I refer to was Mr. Cushman.

X-Q. 108. And since that time you have investigated spot welding on behalf of those interested in contesting the Harmatta patent suit, have you?

A. I have, yes, sir.

X-Q. 109. You have referred in your testimony to the deposition of Mr. Waterman, given in the suit of Thomson Electric Welding Co. et als vs. Barney & Berry, Inc. brought in the District Court of the United States, District of Massachusetts on the Harmatta patent in suit. Is it a fact that in that suit the Thomson patent No. 347140 was offered in evidence by the defendant and explained by the witnesses: Thomson 347141, Benados 363320, Thomson 444928, Thomson 496019, Kleinschmidt 616436, Perry 670808, Ritzel 928701, and German patents to Benados No. 50909?

A. The printed record from which you read so states and I have no doubt that such is the fact.

X-Q. 110. Please merely give me the names and numbers of patents referred to by you on your direct examination which in your opinion describe the same process of spot welding as is described in the Harmatta patent in suit?

A. I cannot do so in fairness to my positon. I referred generally to a number of patents to illustrate the extent to which the art had been developed and the degree of engineering knowledge possessed by prior workers in the art before Harmatta, for the purpose of showing that the same principles had been applied over and over again by prior inventors for welding together pieces or plates or whatever the objects might be. My purpose was to show that specifically prior inventors had recognized the feasibility of that particular refinement of resistance welding in which there was a concentration of current and pressure either by forming projections on the work or by the use of electrodes. I don't pretend to say that my review of the prior art is complete in any sense of the word, since whenever a new situation was presented the apparatus was modified to take care of it, but the underlying principles remain the same.

X-Q. 111. In addition to the patents offered in evidence in the suit of Barney & Berry to which I have referred were the following patents among others set up in the defendant's answer: Lemp No. 553923, Thomson 396,015, and British patent to Ferranti No. 11921 of 1903?

A. Such appears to be the case from the printed record before me and I have no doubt such is the fact.

Adjourned.

Boston, Mass., Aug. 7, 1918.

Met pursuant to adjournment.

Appearances same as before.

X-Q. 112. Please give merely the name and number of the patent of the prior art which you regard as the one which best supports your "position" stated in your answer to X-Q. 110?

A. I can't do so because all the patents to which I have referred illustrate engineering knowledge showing the complete familiarity with the principles of resistance welding as would be used for the welding plates together. Of course some of the patents may emphasize certain points that are not emphasized in others. For instance, the Perry patent points out very clearly the fact that when very heavy currents are used so as to form the weld instantly there is very little conduction of heat away from the spot where the weld is produced. And the Lemp patent No. 531197 points out the desirability of using

water-cooled electrodes. And the Burton patent indicates very clearly the absence of apparent extrusion of metal. The Benardos German patent and Thomson patent No. 496019 point out with considerable particularity the making of electrodes of good conductors or poor conductors with the consequent variation in the precise manner of developing heat at the joint to which I have referred. The Thomson patent No. 396015 for example explains how two spot welds can be simultaneously formed concurrently with a riveting operation. The Thomson patent No. 444928 and the Lemp patent No. 553923 indicate how in addition to forming a spot weld, a continuous or limited extended or line weld can be obtained between the overlapping ends of two sheets. The Robinson patent No. 574942 and the Rietzel patent No. 982071 emphasize the making of the spot welds or "small welding spots" as Robinson calls them, by the formation of projections on the work. Parkinson's British patent emphasizes the making of two spot welds for holding a glut in position in a wheel frame. I have therefore considered all these patents together as indicating the very complete development of the art of spot welding; just the same as if an authoritative book had been written on the subject I would consult the entire book to find out about it.

X-Q. 113. Now referring to the Thomson patent No. 396015 for method of electric riveting, does this patent describe any method of uniting sheets or metal in which a rivet is not used?

A. It described spot welding only in connection with or as an adjunct to riveting.

X-Q. 114. Can't you answer my question yes or no?

A. Surely. I tried to make my answer definite, but if you want a categorical answer I say no.

X-Q. 115. Does the Thomson No. 396015 describe any welding of the plates except "immediately surrounding the rivet". Please answer categorically if you can.

A. I cannot answer the question categorically or at least a categorical answer would not be sufficient. The patent says: "In some cases I may cause the electric current to flow across from piece to piece of the parts to be riveted", and in Figs. 9 and 10 the electrodes which concentrate the current and pressure (said electrodes being indicated by the reference letters K, K1 and K2) are shown as considerably separated, so the resulting spot welds will be correspondingly isolated and separated by considerable areas of non-welding. Therefore, when the patent states that "the plates immediately surrounding the rivet" are brought "to the welding temperature" I turn to the drawing to see what Prof. Thomson meant by the word "immediately" and find that he had in mind the production of spot weld in the plates some distance away from the rivets.

X-Q. 116. Does any figure of the Thomson patent No. 396015, which figure illustrates the completed weld, illustrate any

welding of the plates except immediately surrounding the rivet? And if so, which figure? Please answer categorically if you can or give merely the number of the figure.

A. Figs. 9 and 10 illustrate the formation of two spot welds diametrically with respect to the rivet and at some distance from the rivet.

X-Q. 117. Perhaps you did not notice that my question was limited to the figures in which the completed weld is illustrated. Do any such figures illustrate any welding of the plates except immediately surrounding the rivet?

A. Surely, Figs. 9 and 10 show this very thing. Prof. Thomson in describing Fig. 9, for example, states that when the small insulator blocks m m′ are used the purpose of the clamps would be to hold the plates together but that by omitting these insulator blocks "a heating electric current might be passed through the metal plates themselves, at parts around the rivet," which current will "assist in raising a portion of the plates immediately surrounding the rivet to the welding temperature."

X-Q. 118. Does any one of the figures 5, 6, 7 or 8 of the Thomson patent 396015 illustrate any welding of the plates except immediately surrounding the rivet?

A. No. The particular products illustrated in Figs. 5, 6, 7 and 8 are obtained by using electrodes of the form shown in Figs. 1, 2, 3 and 4. What I have been trying to emphasize is the particular product formed with the apparatus of Figs. 9 and 10.

X-Q. 119. Does either Fig. 9 or 10 of the Thomson patent No. 396015 illustrate the completed weld?

A. No. They show the apparatus in position to make the welds, assuming that the insulators m m′ are omitted in Fig. 9 as Prof. Thomson states may be done. Of course as soon as this current is turned on the two welds are formed in the lines of the opposing electrodes. I direct your attention to the fact that in Fig. 10 these insulators are omitted and the electrodes are directly in contact with the plate.

X-Q. 120. Is it your understanding that piece K^2 shown in Fig. 10 of the Thomson patent No. 396015 bears upon the plate P all around the rivet or only at two places?

A. I have assumed that Fig. 10 shows an arrangement in which two electrodes are used bearing on the plate P at two places since Prof. Thomson states that this figure "shows a modification of the just-described apparatus" of Fig. 9 which clearly shows that such is the case.

X-Q. 121. In the apparatus as shown in Fig. 9, Thomson Patent No. 396015 how was the piece K that you have called an electrode set up against the plates or work so as to clamp them together?

A. The patent states that this may be done by means of a "screw S^1".

X-Q. 122. Are the threads of the screw S^1 shown on Fig. 9?

A. Threads are shown in dotted lines in Fig. 9 which may be the threads of this screw. Of course the provision of means for actuating the so-called clamping devices or electrodes is a matter of very simple mechanical skill. Fig. 1 shows another arrangement.

X-Q. 123. Suppose we take the apparatus just as it is shown in Fig. 9 and remove the mica pieces m m^1 would it be necessary to set up the screw piece marked S^1 in order to clamp the work between the pieces K K^1 ?

A. Yes.

X-Q. 123. When that was done would the prongs of the clamp K, which you have called electrodes, necessarily come opposite the prongs of the clamp K^1 ?

A. If the prongs K are integral with the screw S^1 the prongs K would come opposite prongs K^1 or substantially so, if the apparatus were built to accommodate plates of a definite thickness. But the patent does not state that the prongs K are, in fact, integral with the screw S^1, and I have assumed that they are not, nor do I believe that a person of Prof. Thomson's intelligence would so make them. He would make these prongs separate from the screw as shown in Fig. 1, so that when the screw turned the prongs would simply move in a straight line.

X-Q. 124. Suppose by turning the screw S^1 the prongs K come at right angles to the prongs K^1 when the work was clamped between the two sets of prongs. Under those conditions would the current flow from the prongs K through the sheets to the prongs K^1?

A. Current would flow, but what would happen I do not know. I have considered the patent with the apparatus as illustrated, namely, with the electrodes in line with each other and not at right angles as you suppose in your question.

X-Q. 125. Under the circumstances supposed in my last question do you think that there would be spot welds formed remote from the rivet?

A. I am not able to say.

X-Q. 126. Point out by page and line merely the statement in the Thomson patent No. 396015 which describes the further setting up of the clamp pieces K of Fig. 9 after the passage of the current has been begun.

A. I do not find any specific statement in the patent in connection with Fig. 9 that after the welding current is applied the clamping pieces or electrodes are further set up, but Prof. Thomson does state that these devices "may be forced hard against the plate P P'" and I have no doubt that if further pressure were desirable Prof. Thomson knew perfectly well, and any one familiar with the art knew full well, that it could be applied. However, with this apparatus further pressure would not be necessary because the inherent expansion of the

metal under the effect of the heating current, as Mr. Gravell has pointed out, would inevitably result in the formation of the weld. Of course in Fig. 10 pressure is continuously applied to the electrodes by the springs s.

X-Q. 127. Figs 6 & 7 of the Thomson patent No. 396015, are the only figures illustrating a completed weld in which there is a welding of the plates?

A. These are the only figures of the patent illustrating pictorially or by means of actual lines the weld between the plates. Figs. 9 & 10 illustrate the weld in precisely the same way that Harmatta does, namely, two plates engaged by opposing electrodes. The Thomson specification contains a perfectly clear mental picture of the welds made by the apparatus of Figs. 9 and 10.

X-Q. 128. As you just said, I believe, that Figs. 6 & 7 of the Thomson patent No. 396015 are the only figures illustrating completed welds will you state categorically, if you can, whether either of these figures show a weld between the plates which is not integral with a portion of the rivet?

A. I don't understand what you mean by a weld that is integral with the rivet. If you mean that the rivet is welded into the metal through which it passes, this is shown in Fig. 6. In Fig. 7 the continuity of the rivet appears to be preserved and the weld is formed between the plates.

X-Q. 129. It seems to me that the lines in Fig. 7 which indicate the rivet, are broken so as to leave a space in the middle of the plates. Do you agree to that?

A. This may be, but as I look at the Figure I thought the intention was to show the rivet in broken or dotted lines.

X-Q. 130. Is that still your view?

A. I don't know that I ever had any particularly set view as to the riveting feature of this patent, as my attention was centered on its spot welding feature. It is perfectly conceivable to me that the rivet may substantially preserve its identity as clearly shown in Figs. 5 & 8, or it may lose its identity and become merged with the adjacent metal as clearly shown in Fig. 6. I assumed that in Figs. 7 it had preserved its identity, but there is no reason why it in turn should not be merged with the adjacent metal. It is all a question of heat, and, of course, the metal of the rivets.

X-Q. 131. Do Figs. 5 & 8 of the Thomson Patent No. 395015 show the plates or sheets welded to one another?

A. Apparently not.

X-Q. 132. Referring now to Fig. 10 of Thomson patent No. 396015 how do you understand that the current of electricity is led into the piece K^2?

A. Either through the plunger G or by a separate connection or in any other way that the designer might construct the machine to prevent waste of current.

X-Q. 133. How is the plunger G of Fig. 10 guided, if it is guided at all?

A. Fig. 10 simply shows a modification of the clamping head or electrodes. It is referred to as a modification of Fig. 9 which shows the electrodes carried by "a common bed or support B^1." Such a bed also is shown on Fig. 1 and marked C C^1. I assume that it is guided or supported in the bed or support in any of the obvious ways, for instance, as shown in Fig. 1. In other words, the electrode G of Fig. 10 corresponds to the electrode G of Fig. 1 being additionally provided with the two electrodes and the spring for imposing pressure thereon.

X-Q. 134. Do you think that Fig. 10 shows a single piece K^2 or more than one piece?

A. Two pieces as in Fig. 9, constituting two pair of opposed electrodes.

X-Q. 135. Now turn to patent No. 444928 to Thomson. Is the weld described in this patent as being made by the apparatus of Figs. 1, 2 & 3 a weld between the overlap of the edges of two sheets of metal?

A. In Fig. 1 the weld is formed between the overlapped edges of two sheets of metal. In Figs. 2 & 3 the edges may be overlapped or they may not be overlapped, depending upon how the plates are put together and where the weld is made. Prof. Thomson states that the invention relates generally to the joining or welding together of strips, sheets, etc., "where it is desirable to form a joint of considerable length" and then he indicates as a specific or desirable practice the "welding of plates together at their edges." I notice in glancing through the claims that the 5th claim for example refers to the passage or delivery of the current "through surfaces *near* the edge of the work" which would imply within the edge.

X-Q. 136. Describing the operation shown on Fig. 1 the Thomson patent No. 444928 says, page 1, lines 84 to 94, "The edges are slightly overlapped, as shown, and the plates, being in position between the rows, may be squeezed together by means of the screw S thus forming an electric contact between them. The electric current being now turned on as it passes from one roller to the other, and across the point of pressure will heat the work to the welding temperature and soften the same slightly, after which the screw may be given a few more turns to effect a solid union?

Does the patent describe a further manipulation of the screw as the work is moved along through or between the rollers?

A. No.

X-Q. 137. Figs. 1, 3 & 3 show rollers of different diameters, do they not?

A. Figs. 1 & 3 show rollers of different diameters. Fig. 2 shows segments. The relative scale of the drawings is not indicated.

X-Q. 138. Do you understand that the process described and the result obtained would be materially changed by a change in the diameters or radius of the rollers?

A. I see no reason why within limits, there should be any difference in the process or product by changing the diameter of the rollers. Of course they should not be too small or too large; what the limits are I do not know. I have made such welds with rollers of different diameters, varying from between two to three and a half inches, as I recall.

X-Q. 139. Suppose the rollers were as large as 10 in. in diameter would the process and product be the same?

A. Of my own knowledge I don't know, but I see no reason why there should be any difference provided the proper current is used.

X-Q. 140. Considering the apparatus as shown in Fig. 1 of the Thomson patent No. 444928 and with the edges of the sheets overlapped as shown in that figure, what difference would there be in the process and in the product if the bearing faces of the rollers were increased in width? By bearing faces I mean the entire width of the flat periphery and not merely the portion of that periphery which bears upon the work.

A. Of course I do not see any need of extending the width of the faces of these rolls, but if this is done I do not see that it changes the process or product.

X-Q. 141. Suppose the operator of a roller welding machine operating as shown and described in this Thompson patent No. 444928 runs the machine at exactly the right speed to make a good weld and then suppose on the next piece of work he runs it materially slower, what would be the effect on the work, other conditions remaining the same?

A. What metal is assumed to be used?

X-Q. 142. Take steel sheets.

A. The welding range of steel is quite extensive. If in the first case the speed was calculated to make a weld as nearly as possible to the lowest temperature point, then a substantial diminution in speed without cutting down the current might have no important effect except possibly to produce more extrusion. But if in the first case the operator was working at a speed to give a welding heat near the maximum then a substantial reduction in speed without a proportional decrease in current might burn through the plates.

X-Q. 143. And if the operator increased the speed of the feed of the plates between the rollers what effect would that have?

A. Of course if the operator made the speed so high as not to allow time for the weld to form, then no weld would form. The same is true with all welds; sufficient time must be allowed for the metal to reach the welding temperature.

X-Q. 144. About what is the welding temperature of common, ordinary low carbon commercial steel?

A. That of course is given in the books. My recollection is between 1200 to 1500 C.

X-Q. 145. What is the melting temperature of tin?

A. About 230 degrees centigrade.

X-Q. 146. What is the melting point of magnesium? ?

A. According to the books about 650 degrees C.

X-Q. 147. Referring to the Thomson patent No. 496019 for electric soldering is the tin between the surface of the plates melted as the process is described in the patent?

A. Yes.

X-Q. 148. Do you recognize a well defined difference in principle between electric welding by what is sometimes called the electric resistance process, wherein the pieces are brought to welding temperature by the development of internal heat in them and an electric soldering process such as is described in the Thomson patent No. 496019?

A. No. I recognize no distinction in principle between the two, but regard the principle of one as precisely the same as the principle of the other, namely, the development of heat electrically in the neighborhood of the contiguous parts to be joined. I grouped the two processes in the same way that they are grouped by the Thomson Co., for instance in the Lemp patent No. 553923 which states that the invention relates to "welding, soldering, cementing or *similar* operation." The only difference is the necessary adjustment of current and time to secure the desired heating principle.

X-Q. 149. Do you recognize any well defined difference in principle between such electric soldering as is described in the Thomson patent No. 496019 and a soldering process in which the heat is developed in an exterior mass such as a carbon electrode, and that electrode is applied to the back of the work?

A. As I understood your question, that is precisely what Prof. Thomson proposes in his patent No. 496019, at least as one of the modifications of his method. Of course, as the resistance of the exterior electrode is reduced less heating effect is secured by that means and more heating effect is secured interiorally by the resistance of the work. The two things merge into each other, and it is impossible to say that a clear line of distinction exists between them. As I have pointed out in my direct examination, even with copper electrodes they frequently get very hot and frequently also energy is expended at the contact between the electrodes and plates.

X-Q. 150. According to a printed copy of your testimony in the Ferranti-Harmatta interference you are reported (X-Q. 30) to have testified as follows: Do you recognize a well defined difference in principle between electric welding by the what is sometimes called the electric resistance process, wherein the pieces are brought to welding temperature by the development of internal heat in them and an electric soldering process, such as that which may have been witnessed by you as you now state?

A. I recognize fundamental distinctions between a process in which heat is developed by the internal resistance of the metals to be joined and that in which heat is developed in an exterior mass such as a carbon electrode? There is, of course, a distinction between electric welding in which the surfaces to be joined merely reach a condition of plasticity and electric soldering in which a metal having a lower melting point is actually melted and becomes liquid, but the two processes may be very closely allied. If, for example, the separate pieces C[1] shown in Figure 5 of the Rietzel Patent were properly chosen with respect to melting points of the plates to be joined, I should say that such a process would be electric soldering or brazing. Have I quoted correctly from your testimony the entire X-Q. 30 and your answer thereto?

A. You have.

X-Q. 151. Referring to the Robinson patent, No. 574942, what are the projections lettered which are welded to the rail?

A. On the girder plate B they are the "slight upward projections or contact points d". On the fish plate C they are the "projections i".

X-Q. 152. Do you think there would be any practical difficulty in welding the projection d to the bottom of the rail?

A. No, I don't think so.

X-Q. 153. Do you think there would be any practical difficulty in welding the projections i to the rail?

A. I think not. What Robinson proposes is the same in effect as what Rietzel proposes in patent 928701, and I have no reason to question the complete success of such a process.

X-Q. 154. I suppose you have tried the Rietzel process, haven't you?

A. I have tried substantially the same thing as the Rietzel process, namely, where the projections are concurrently formed by the electrode itself. I have reference to the practice of an operation similar to that illustrated in the photographs which I introduced at Washington where the pressure of the electrode forces down the metal at the edge to thereby form a projection, or, as Prof. Thomson described the operation, where the electrodes pinch the metal.

X-Q. 155. As I understand you have not practiced welding with prepared plates or projections as shown and described in the Rietzel patent No. 928701?

A. No.

X-Q. 156. Have you ever tried the welding operation described in the Robinson patent No. 574942?

A. I have never tried that but I have made enough experiments and tests to satisfy myself that what Robinson says in his patent as to the operation is correct; that is to say, as near as anything can be determined a *priori*.

X-Q. 157. What becomes of the metal of the projections in the process described in the Robinson patent?

A. The same thing as Figs. 3 and 4 of the Reitzel patent; that

is to say the metal is displaced, and the amount of that displacement or thinning depends upon the amount of metal in the projection.

X-Q. 158. Can you tell me where the metal goes to?

A. Like all softened metal when it is subjected to pressure it flows in the paths of least resistance. If the electrodes pressing upon the girder bar or fish plate are flat, as with Reitzel, the flow will be between the plates, and the extent of that flow will depend upon the plasticity of the metal and the pressure applied.

X-Q. 159. Do you mean that the flow of the metal of the projections is sidewise, so to speak; that is, the projections are squashed out in the Robinson process?

A. Yes, and the amount of squashing, to use your term, would depend upon the amount of metal in the projections.

X-Q. 160. What were the experiments which you have referred to on which you based your opinion of the practicability of the Robinson process? When and where were they performed and with what materials?

A. I have performed many scores, if not hundreds, of spot welding operations, with National spot welding machines at Warren, O. I spent an entire week at Detroit, at the plant of the Ford Motor Co., operating the Winfield machine. I have also performed spot welding operations with Toledo machines at the plant of the Empire Cream Separator Co., at Bloomfield, N. J. I have built a spot welding machine myself which I have operated many times for the making of spot welds. All of this was subsequent to October, 1916. I have used copper electrodes, steel electrodes, Tungsten electrodes, and Iridium electrodes. I have used electrodes of many shapes, some conical with blunt points, some with comparatively sharp points, some long like pointed lead pencils as shown by Harmatta, some flat. I have also used roller electrodes with narrow faces and wide faces, and I have also used roller electrodes with teeth cut in their periphery so as to form a succession of isolated welds instead of continuous welds. I have welded iron plates of varying thickness, steel plates, copper sheets, nickel plates to iron bars, and have done actual practical welding of stock material such as the manufacture of cooking utensils prior to enameling and also shells for resistance boxes. I have also used carbon electrodes and graphite electrodes and electro plated carbon electrodes. In all of this work I never failed to observe that the welding current when confined to a small path would be concentrated, resulting in the production heat and if there is sufficient current to bring the parts to a welding temperature a weld would be formed under pressure. I have also operated butt welding machines at the plant of the National Co. at Warren, O., and have observed the same thing. I neglected to say that I built a butt welding machine myself to carry on certain work having no connection with this case, and with which I also carried out so-called percussion welding. Because of the observations which I have made I have no doubt that, as

suggested by Robinson, the projections i or d, as the case may be, will result in the formation of "small welding spots" as he described them in his patent.

X-Q. 161. Were these experiments, to which you have referred in your last answer, with the exception of the last mentioned butt welding machine, made on behalf of the interests who are contesting the Harmatta patent?

A. The observations which I made at Warren, O., were made on behalf of the clients of Mr. Cushman, whose names I have forgotten. The observations which were made at the Ford plant were made for the present defendant. The observations which I made at the Empire Cream Separator Co. were made, I suppose, largely as a matter of personal curiosity; I am a stockholder in that company and took occasion while visiting the plant to operate their welding machines.

X-Q. 162. Is the Empire Cream Separator Co. a member of the Welding Patent Investigating Committee?

A. That I don't know.

X-Q. 163. I gather from your answer about your experiments that you have not made experiments on welding pieces of metal together, on one of which pieces there are one or more projections which are welded to the other piece? Am I right in that understanding?

A. I just happened to think that in experimenting with steel electrodes which do in fact constitute points to concentrate the current a weld would be formed between that electrode and the plate, but quite apart from this observation, and if I had not observed it I would still be confident that currents can be concentrated as suggested by Robinson. I can't say that I have actually taken two plates of metal, one or both being formed with projections, whereby the current would be concentrated and obtaining the weld in this way.

X-Q. 164. According to the Robinson patent how many of the projections are welded at the same time to the rail?

A. That depends, of course, upon how many projections there are. Enough would be used to make a sufficiently strong joint, and that would depend upon the use to which the process is applied. Robinson shows in Fig. 1 three projections d on the girder plate for welding the same to the rail, and he shows six tapered projections i on the fish plate for welding the same to the side of the rail. Robinson in his patent does not say that any particular number of projections must be used.

X-Q. 165. Do you understand from the Robinson patent that all projections d, namely 3, or all the projections i, namely 6, are welded to the rail in one operation?

A. I understand that the projections d on the girder plate are welded at one operation and that the projections i are all welded at another operation.

X-Q. 166. In your welding experience what was the largest current used by you in amperes?

A. I don't know. I used a sufficient current to make a spot weld in a very short time. In operating my own spot welder I used a current between 2500 and 3000 amperes and less.

X-Q. 167. How big a spot weld was the largest spot weld that you ever made and how thick were the sheets?

A. I made no effort particularly to make large welds but as I recall they averaged when pulled apart possibly 3/16ths of an inch in diameter. Most of my work was with rolled steel .020 of an inch in thickness, but I used some thicker material and some thinner.

X-Q. 168. What was the maximum thickness of the sheet?

A. When I welded a cold rolled steel plate about 1/32 of an inch thick to a half inch bar.

X-Q. 169. And made a weld of what size or diameter?

A. My recollection is that an ordinary copper electrode was used such as employed in standard spot welding and I should suppose the spot weld would be the usual diameter, but I did not pull the plates apart to measure. My observation of ordinary spot welds is that they are about ⅛ of an inch or 3/16ths of an inch in diameter.

X-Q. 170. How large was the current in amperes which was used to make this weld?

A. All the current I could get through the Winfield welder, but I don't know the number of amperes.

X-Q. 171. Can't you give me an estimate of the amperage of the current?

A. No, I can't. I should say it was somewhere between 2500 and 4500 amperes.

X-Q. 172. Is that the largest current you ever used in your experiments?

A. No. I don't know what the largest current was, but one of the machines I operate at the plant of the National Co. was a very large spot welder, the upper electrode being pulled down by either a hand lever or a foot lever, and the great quickness with which that machine made a spot weld convinced me that a heavy current was passing, although I did not measure it. The current of course determines the time of welding. The greater the current the less the time provided that other things were equal such as thickness of plates and pressure.

X-Q. 173. Can you give me an estimate of the amperage of the current used in the machine referred to at the National Co.?

A. No, I cannot. It would simply be guessing.

X-Q. 174. How thick were the sheets in which the weld was made with this machine?

A. As I recall about 20 thousandths.

X-Q. 175. What was the size of the weld made?

A. My best recollection is that ordinary standard spot welding electrodes were used, which would make the weld in the neighborhood of an eighth of an inch. I don't think that I ever made an attempt to caliper these welds, and my answers as to their size is the dimension I have carried in my mind.

X-Q. 176. Did you in your experiments ever measure the amperage of the currents used?

A. Yes. I have previously stated that in operating my own machine I used currents up to between 2500 and 3000 amperes. I know that I succeeded in burning most of the insulation off the secondary leads. I made no particular attempt in any of these experiments to measure exact quantities of current. My idea was to familiarize myself with the practical operation of spot welding machines. These machines are almost always provided with some sort of an arrangement for varying the voltage, and when a weld is not properly formed at a low voltage the practice is to increase it somewhat and try again.

X-Q. 177. Do you recognize any difference in principle between the process described in the Robinson patent 574942 and that described in the British patent Ferranti No. 11921 of 1903?

A. Offhand I must say that I see very little difference in principle between the two except that in the case of Robinson it appears very clearly that pressure is applied to force the two pieces of the work together whereas with Ferranti the turbine blades are apparently welded to the projections which more or less preserve their identity.

X-Q. 178. Does this distinction apply to Fig. 14 of Robinson patent and also Fig. 18 and Fig. 20?

A. Yes. In Robinson patent the fish plate is shoved in as far as it will go, fitting between the foot and the head of the rail. Of course the two plates (viewing the web of the rail as one plate and the fish plate as another plate) are not pressed into intimate contact. The amount of their separation depends upon the amount of metal in the projection. If there is very little metal in the projections then the plates will come more closely together.

X-Q. 179. In the process described in the Kleinschmidt patent No. 616436, how many sheets or plates are welded together at one operation?

A. Viewing the web of the rail as one plate, then three plates are welded together the same as in Fig. 10 of the Rietzel patent.

X-Q. 180. Does the Kleinschmidt patent describe the welding together of only two plates?

A. Apparently not. Kleinschmidt in his patent evidently proposed to use a splice bar on each side of the rail so as to make a very strong joint.

X-Q. 181. What becomes of the metal of the projection or boss b in the finished Kleinschmidt weld?

A. The patent says: "The bosses b extend only a very short distance from the main body of the bar, so that they will not prevent the bar from making close engagement with the rail and so that any tendency which they may have to bulge out will be prevented by the rapid cooling and compression to which they are subjected." To what extent the metal may be compressed I am not able to say as I have made no observations on that point, but

if there is sufficient metal in the bosses I should say there would be slight extrusion between the plates. This might be microscopic. I have observed it in spot welds.

X-Q. 182. Coming now to the Burton patent, No. 647694, it appears to me that in Figs. 1, 2, 6, 7, 8, 9, 10, 11 and 12 that the end of the two pieces or the two pieces themselves are not in contact with each other as shown. Do you agree to this?

A. That seems to be the draughtsman's way of illustrating the fact that there are two pieces.

X-Q. 183. May I take it that your answer is in the affirmative?

A. As a matter of illustration, yes. But as a matter of common sense, no.

X-Q. 184. As shown in Fig. 2 will some of the current pass from the electrode 210 to the electrode 100 through the work without crossing the joint?

A. In Fig. 2 the work is shown as a tire which, of course, is completely circular. The upper electrode is also curved to make contact with the tire throughout its face. The bottom electrode 100 is flat. Therefore the work engages the bottom of the electrode at a single line coincident with the joint, and the resulting weld, therefore, would be a line of welding extending across the joint, the current in this case being concentrated by reason of the peculiar shape of the work instead of by the shape of the electrodes.

X-Q. 185. In Fig. 2 do both ends of the work come in contact with the upper electrode 210?

A. The electrode No. 210 engages the work on both sides of the joint.

X-Q. 186. In Fig. 2 are both ends of the work in contact with the lower electrode 100?

A. No, the work is curved as I explained, and therefore engages the lower electrode at only a single line, namely, near the end of the section at the left.

X-Q. 187. In Fig. 1 are both ends of the work in contact with the upper electrode?

A. I think Fig. 2 is intended to show the same thing as Fig. 1 on a larger scale.

X-Q. 188. In Figs. 7 and 8 is the upper electrode in contact with both pieces of the work?

A. I think so.

X-Q. 189. Is the same true of the lower electrode in those figures?

A. Yes.

X-Q. 190. In Figs. 9 and 10 are both the upper and lower electrodes shown as bearing upon the work throughout their length?

A. Apparently this is so.

X-Q. 191. In Figs. 11 and 12 are both the upper and lower electrodes each in contact with each end of the work or with the two pieces of the work, whichever way it may be?

A. Yes.

X-Q. 192. Is Fig. 13 the only figure of the patent which shows two sheets overlapped as distinguished from two sheets scarfed over each other?

A. If you make any real distinction between overlapping and scarfing, which I do not admit, that is true.

X-Q. 193. Is Fig. 13 the only figure which shows the sheets united with a rivet?

A. Yes.

X-Q. 194. How is the hole in Figs. 3 and 4 countersunk by the electrode 210?

A. The electrode concentrates the current around the hole so as to soften it, thus permitting the electrode to be shoved down into the softened material to enlarge the hole or produce a countersink therein.

X-Q. 195. Would this make the hole smaller below the action of the electrode?

A. If a sufficiently heavy current were used to locally soften the metal I should think that countersinking could be performed in this way although it would produce an upset. I believe the workman could do this without affecting the diameter of the hole at the bottom. Of course if he worked very slowly with too little current he would probably make a bad mess of it.

X-Q. 196. What uses are specified by the Burton patent for the specific electrodes 220, 230, 240 and 260, shown in Fig. 1?

A. Burton intended to provide an apparatus capable for general metal working, and the patent points out a large number of things that could be done with it. It says that the electrodes are "of different shapes adapted for different purposes." Electrode 220 appears to be a disc with a flat face and might be conveniently used for brazing for which the apparatus is described as being adapted. Fig. 230 shows an electrode in the form of a channel and might be used, for example, for welding the two flanges of the tire shown in Fig. 6. Electrode 240 is clearly shown as spherical for concentrating the current, and if used as described by Burton would indisputably produce a spot weld in overlapping plates. Electrode 260 appears to be a flat rectangular electrode suitable for welding straight channels instead of curved channels in Fig. 2. Same reference number 260 in Fig. 2 appears to show the specific electrode of Fig. 7. The whole apparatus is intended to present to the blacksmith or other metal worker a box of tools so to speak which he can make use of for carrying out many different kinds of welding operations.

X-Q. 197. Confining your answer to the uses specified in the patent of your electrodes 220, 230, 240 and 260 shown in Fig. 1 do you find any reference to the use of these electrodes, or any of them, than that which you have already quoted which refers to "a plurality of radial arms, as 210, 220, 230, 240, 250 and 260, said arms carrying electrodes of different shapes adapted for different purposes?

A. Yes. I find that Burton states in describing the welding of overlapped piece that "one of the electrodes of the electrode head is brought into contact with the work" from which I understand that any one of these electrodes which the operator might select. And if the electrode 240 is selected, then, as I have described, a spot weld will be produced.

X-Q. 198. And you have quoted from the Burton patent all that you find with reference to the electrodes No. 220, 230, 240 and 260?

A. Yes.

X-Q. 199. Referring now to the Parkinson British patent No. 14536 of 1894 what is the function of the two die pieces b b^1?

A. Apparently these die pieces are used to prevent any metal from extruding between the glut pieces and wheel so that the glut pieces will always occupy a fixed relation with respect to the circumference of the wheel.

X-Q. 200. These die pieces when in their thrust out position and the adjacent portions of the spokes form a closed die into which the glut piece is compressed by the hydraulic ram? Is that so?

A. Yes, and when the glut is thus held in place the current localized by the two electrodes L forms the two welds.

X-Q. 201. Why does Parkinson employ the cap pieces or clamps L^1?

A. To somewhat extend the length of the electrodes, the purpose being stated in the patent to be "to fit the radius of a larger wheel C^1.

X-Q. 202. The patent provides for the application of 8 glut pieces. Do you understand that these are all welded at the same time?

A. I think the patent contemplates either the formation of all welds simultaneously or separately. For instance, it says: "The invention consists essentially in constructing the apparatus with one *or more* alternating or continuous current transformers or generators working in conjunction with a number of hydraulic cylinders and rams, the transformers or generators being connected with the bed plate or support upon which the articles are placed, so that the current passes through that part of the article *or at the point* which is required to be treated, and maintains it at the desired temperature whilst the hydraulic rams compress it and effect the welding." Then the patent says that the apparatus "may be varied to suit different forms of work" (page 4, line 5) and continues: "In the construction of the machine several transformers may be employed placed diametrically opposite each other the secondary circuits of which are directly connected to the work in hand thus separate transformers can be applied to different parts to be heated."

X-Q. 203. Of what material is the contact block M?

A. The patent does not state, so far as I can see, but the expression "contact block" would mean I think a block in which good contact was desirable so that the metal would be selected from that viewpoint.

X-Q. 204. Do you regard copper as a likely material?
A. Yes.

Adjourned to 9:30 August 8, 1918.

Boston, Mass., August 8, 1918.

9:30 A. M.

Met pursuant to adjournment.

Counsel present as before.

Cross-examination continued.

X-Q. 205. Referring now to the Perry patent No. 670,808, what is the work which is described as being welded? Please indicate it by reference letter and state of what it consists.

A. Perry in Figs. 4 and 5 for example, shows the welding together of two crossed wires which may be galvanized wire, or iron wire covered with a coating of zinc (page 1 lines 81-82) and in Figs. 6 and 7 two balls are shown as being welded together. The patent does not state specifically what the metal of the balls is although it indicates possibly by implication that these balls also are coated with metal.

X-Q. 206. According to Perry are the rods or the balls united throughout their contacting surfaces?

A. Yes.

X-Q. 207. Referring now to the German Patent 50,909 to Benardos do you understand that the operation intended to be carried out by the apparatus of Fig. 1 is a soldering operation or a true welding operation, bearing in mind the distinction between soldering and welding?

A. From the translation of the Benardos patent which has been furnished me, a copy of which has been furnished cross-examining counsel, I understand Fig. 1 to represent a true welding operation in which the metal of the plates at the joint is welded rather than a soldering operation in which the joint is formed by uniting metals of lower melting point.

X-Q. 208. Referring still to Fig. 1 of the Benardos German patent at what part of the electric circuit is the heat developed for this purpose?

A. Within the electrode itself w, at the point of contact between the electrode and the plate A^1 and at the joint between the two plates.

X-Q. 209. In the apparatus shown in Fig. 1 of the German Benardos patent does the current cross the joint between the plates A and A^1?

A. Not in the apparatus as specifically shown but the patent states that "In certain cases, however, it may be of advantage to

make the backing support of the work which resists the pressure of the tool, of material (metal) which conveys heat away rapidly." When such a metal backing is used I assume that one of the secondary leads would be connected with it, and when that is done the current will pass through the joint as in Fig. 2 of the Benardos patent.

X-Q. 210. By "Secondary leads" do you mean the wire from the secondary of a transformer?

A. Yes.

X-Q. 211. Quote from the Benardos patent any description contained therein of the use of the transformer?

A. The patent refers to "a powerful source of electricity of low internal resistance" which I would understand to be either the secondary of a transformer or a generator of current of low voltage. The patent does not specifically use the expression Transformer.

X-Q. 212. Taking the apparatus as is shown specifically in Fig. 1 of the Benardos patent, in which the current does not cross the joint between the plates A and A^1 is any heat developed at the joint by the current?

A. Only indirectly by conduction.

X-Q. 213. Conducted from what as a source of heat?

A. Conduction from the electrode w and from the surface of the plates A^1 where heat is developed by the resistance of contact between that electrode and the plate.

X-Q. 214. Throughout the patent the electrodes referred to as w, w', w" are described as bad conductors or poor conductors or words to that effect, are they not?

A. That appears to have been Benardos preferred arrangement although in the first paragraph he refers to materials which are relatively good conductors or at least to arrangements in which there will be less disparity between the resistance of the electrodes and the resistance of the work, and which when used will result in the development of more heat in the work itself.

X-Q. 215. Have you read the German text of this patent?

A. I do not understand German sufficiently to enable me to pass upon the patents in that language. Yes, I have read it but cannot say I understand it from the German.

X-Q. 216. In testifying concerning this German patent you have relied on the translation furinshed by counsel for defendant and heretofore referred to by you?

A. Yes, and also as I recall from the translation of this patent appearing in the record of the Barney & Berry case.

X-Q. 217. Do you know who made the translation furnished by defendant's counsel in this case?

A. Only by hearsay. I was told by Mr. Church that it was made by Mr. Coombs of Washington.

X-Q. 218. Did you ever talk with Mr. Coombs concerning the disclosure of this German patent?

A. No.

X-Q. 219. Do you know enough German to know that the German word "mit" means with?

A. Yes.

X-Q. 220. Do you know enough German to know that the German word "löth" means solder?

A. No.

X-Q. 221. Do you know enough German to know that the German word "arbeit" means work?

A. No.

X-Q. 222. In your consideration of the Thomson No. 444,928 have you assumed that the rolls R and R' are of copper?

A. Yes. They are described as of "conducting material."

X-Q. 223. As shown in Fig. 1 of the Thomson patent 444,928 each of the rolls R R¹ is shown as contacting with one of the sheets at a place which is not opposite the joint as well as at the place opposite the joint. Is that so?

A. Yes, the area of contact is shown as being greater than the area of the joint in Fig. 1. This would substantially reduce extrusion.

X-Q. 224. Is that portion of each sheet, which is in contact with the roll and not opposite the place to be welded, heated by the passage of the current?

A. The current would be principally concentrated in the path corresponding to the width of the joint and in this path the principal heating effect will be secured. There will, however, be a slight diffusion of the current in the plates at each side of the joint and this will produce a heating effect proportional to the current flow.

X-Q. 225. You have referred to seeing spot welding carried out at the works of the defendant, the Ford Motor Co. When was this?

A. In March, 1918.

X-Q. 226. Did you see the welding of any other parts than the mufflers?

A. I did.

X-Q. 227. What parts?

A. Spot welding machines were used for the purpose of upsetting the ends of valve stems for the valves of Ford motors, the stem and valve first being pre-heated in a muffle and the upper electrode brought down upon the end of the valve stem projecting a short distance beyond the valve so as to heat that valve stem by concentration of the current therein, thus softening the metal and forcing it down upon the valve. This operation is similar to riveting and illustrated one of the uses to which spot welding machines can be applied. Other spot welders were used for performing the same operation in upsetting the projecting end of a contact plate used in the Ford distributer, this being also analagous to a riveting operation. Other spot welders were used for welding a metal sheath to the steering post of the Ford car, and in this operation only a single electrode was used. The post itself constituted practically

the other electrode. Other spot welders were used for tightening two small metal pieces together which had previously been riveted in the ordinary way. Other spot welders were used for securing a long strip to the fender of the car. I have photographed all of these operations, which I will be glad to show you, if counsel for defendant consents. Other spot welders were used in forming the radiators, and still others in connection with body making. Also spot welders were used in manufacturing the connection between the carbureter and the engine which I have photographed.

X-Q. 228. You have shown me some photographs. Did you have any other photographs taken of the spot welding work or apparatus at the defendant's plant?

A. Only those photographs showing the manufacture of mufflers, which I produced at Washington.

X-Q. 229. Have you any photographs of your experimental work with spot welders in addition to what you have already shown me?

A. Yes.

X-Q. 230. Are you willing that I should see those photographs?

A. Yes, sir.

X-Q. 231. Are you paid as an expert in this case by the defendant or by some other person or persons?

A. By the Ford Motor Co.

Redirect Examination by MR. CHURCH.

By MR. CHURCH:

Re-D. Q. 232. You have produced a series of photographs in response to questions put by the cross-examiner illustrating work done by spot welders at the defendant's plant and apparatus by which such work was done. Will you please briefly describe these photographs and mark them with some designation by which they may be identified.

A. Photograph marked B^1 shows the two sections of the fender prior to welding, and photograph marked B^2 shows corresponding sections welded together. Photograph B^3 shows a valve for the Ford engine, the view at the right illustrating the valve stem before it has been upset and the view at the left showing the valve stem after upsetting. Photograph B^4 shows the spot welder used for upsetting the valve stems, the lower electrode being provided with a vertical hole therein through which the valve stem passes, and this lower electrode being slidable outwardly from its operative position by means of a handle so as to permit the valve stem to be placed in position. Photograph B^5 shows the lower electrode pulled out with the valve stem and valve in position. And photograph B^6 shows the parts in position to effect the welds or upset, the upper electrode being brought down into contact with the valve stem above the valve.

Photograph B^7 shows a small contact plate used in the Ford

distributor, the view at the left showing the parts before upsetting, and the view at the right showing the parts after upsetting. The welder used for performing this upsetting operation is illustrated in photographs B^{7x}, B^8, B^9. With this machine the lower electrode is provided with a vertical hole which receives the stem of the contact member. Photograph B^{7x} shows the machine, or rather the arms or horns thereof, without the work in place. Photograph B^8 shows the same thing with the work in place, and photograph B^9 shows the upper electrode brought down on the stem to upset the same.

Photograph B^{10} shows a small lever which, as I recall, is used in the ignition system, composed of two parts riveted together in the usual way. The rivet head being shown in both views. The view at the right shows these parts before electric welding has been performed, and the view at the left shows the parts after electric welding. I call particular attention to this latter view which very clearly shows that although the weld has been formed within the edge of the work the metal has been extruded through the joint between the work and appears as a small fin of projecting metal.

Photograph B^{11} shows a so-called hot air pipe, many of which I saw welded, the upper view illustrating one section of the pipe, the middle view showing the other section of the pipe, and the bottom view showing the two sections welded together. Both of these welds clearly illustrates extrusion of metal.

Photographs B^{12}, B^{13} and B^{14} illustrate the welding used for welding to the steering post the metal sheath through which pass the wires or wire controlling the throttle or timing operations, as the case may be. The first of these photographs B^{12} shows the welding machine without the work, the lower arm of the welder being provided with a saddle in which the steering post rests, this steering post being tubular. Photograph B^{13} shows the work assembled, the upper electrode having just performed a welding operation, and photograph B^{14} showing the upper electrode performing this operation.

Re-D. Q. 233. Will you in like manner identify and mark the photographs which you have referred to as illustrating your experiments

A. Photograph marked C^1 is a picture of my assistant, Mr. Perkins, and myself making a line weld between two plates.

Photographs C^2, C^3 and C^4 illustrate various roller electrodes with which I operated at Detroit.

Photographs C^5 and C^6 illustrate the use of a roller electrode, the periphery of which is formed with a series of teeth like a gear wheel so as to produce a series of isolated or separate welds, each surrounded by an area of non-welding.

Photograph C^7 illustrates various electrodes with which I made experiments at Detroit. In this photograph the electrode at the left on the top line and also at the right are carbon electrodes. The photographer has not assembled these in pairs; the pointed

electrodes should go together and so also should the blunt electrodes. The electrodes at the center of the top line are copper electrodes with hollowed outfaces suitable for riveting or for making annular welds. In the center line, the electrodes at the left are copper electrodes, those in the middle are steel electrodes, and those at the right are copper electrodes with Tungsten points. In the bottom line the electrodes at the left are copper electrodes made long and pencil-like, the next are flat or disc-like electrodes, the next are ordinary standard spot welding electrodes of copper and the electrodes at the right are each provided with two contact faces to make two welds simultaneously.

The final photograph marked C^8 is an apparatus which I built to make two spot welds concurrently with a riveting operation, the riveting being performed by means of hollowed or concave electrodes screwed in place in the usual way.

Re-D. Q. 234. Please state whether or not the apparatus and electrodes illustrated in this series of photographs C^1 to C^8 inclusive were successfully used and the result of their use?

A. They were. With all of them I obtained the welds between metal sheets corresponding to the form or shape of the electrodes.

Re-D. Q. 235. Would you be willing to repeat the tests made with the apparatus and electrodes shown in this last-mentioned series of photographs for the benefit of the plaintiff's counsel?

A. I will cheerfully do so.

Re-D. Q. 236. State whether or not since making these tests you have been able to test the use of electrodes of iridium for producing spot welds, and if so, with what result?

A. Yes, I have done so with entirely successful results.

Re-D. Q. 237. The Harmatta patent says, page 1, line 57: "By the term 'electric welding' as used herein, I mean that well-known process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure." Do you find any warrant for this statement in the Harmatta original application?

A. I do not.

Re-D. Q. 239. In the Harmatta patent, page 2, line 83, I find this statement, "Sheet metal work made by this process is readily distinguished from that made by prior processes by the comparative absence of burning, roughening or disintegration of the material on the back of the plate when the operation is carefully conducted. It further possesses the advantage that there are no rivet heads to mar the finish of the back or outer surfaces of the plate." State whether or not you find any warrant for this statement in the original application of Harmatta.

A. Not the slightest.

Re-D. Q. 239. State whether or not according to your observation or experience spot welding is used in preference to ordinary riveting where a strong and reliable joint or union is required.

A. It is not. The character of the weld is too uncertain.

Re-D. Q. 240. In the use of an ordinary spot welding machine—a standard machine—what would be the effect of holding the work too long between the electrodes of the machine?

A. There would be danger of burning through the plates so as to make a hole.

Re-D. Q. 241. When, as you have stated, you used iridium as electrodes for spot welding what was the nature of the plates upon which you operated? Give their material and thickness.

A. Cold rolled steel plates about .020 inch in thickness.

(Mr. Church: Counsel for defendant requests counsel for plaintiff to admit without formal proof that the several patents to Thomson and to Lemp and to Rietzel are owned by the plaintiff or its predecessor, Thomson Electric Welding Co.)

(By Mr. Stackpole: Counsel for plaintiff will stipulate as to these facts when he ascertains what the facts are.)

Re-D. Q. 242. Does the photograph B^2 show two spot weld in the upper right-hand corner of the fender uniting the fender to the long strip shown?

A. Yes, sir.

Deposition closed—signature and certificate waived.

Adjourned until further notice.

THOMSON SPOT WELDER COMPANY
vs.
FORD MOTOR COMPANY.

Met pursuant to agreement of counsel at the offices of Fish, Richardson & Neave, 84 State Street, Boston, Mass., 3 P. M., October 3, 1918.

Evidence for the defendant taken under Equity Rules of the Supreme Court of the United States by agreement of counsel.

J. L. STACKPOLE, Esq., counsel for plaintiff.
MELVILLE CHURCH, Esq., counsel for defendant.

Direct Examination of CHARLES F. TISCHNER.

Question 1. Please state your name, age, residence and occupation.

Answer. Name, Charles F. Tischner; age, 38; residence, New York City; occupation, patent attorney.

Q. 2. With what firm are you associated, if any?

A. The firm of Townsend & Decker.

Q. 3. How long have you been associated with that firm?

A. I have been associated with that firm for approximately 15 or 16 years.

Q. 4. In what capacity?

A. Preparing specifications and conducting cases for the Patent Office.

Q. 5. I hold in my hand what purports to be a certified copy from the records of the Patent Office of the file wrapper and contents in the matter of the Letters Patent of Adolph F. Rietzel, assignor to Thomson Electric Welding Company, No. 928,701, granted July 20, 1909, for improvement in uniting the component parts of composite sheet metal structures. From a copy of the drawing of the patent which appears in this file and from other papers in the file, it appears that the solicitors who solicited this Rietzel patent were Messrs. Townsend & Decker, and it also appears that C. F. Tischner, Jr., appears as a witness in that drawing. Were you associated with Messrs. Townsend & Decker during the prosecution of the application of this patent, and is that your name signed as a witness on the drawings?

A. I was, and it is my name. At that time I used the word "Jr." after my name, but since then I have dropped it owing to the death of my father.

Q. 6. State whether or not you took part, as the representative of Messrs. Townsend & Decker, in the prosecution of this Rietzel application?

A. I took part in a general way.

Q. 7. What do you mean by having taken part in a general way?

A. I did not have direct conduct of the case.

Q. 8. It appears from this file wrapper that an affidavit was executed by the applicant Adolph F. Rietzel bearing date October 23, 1908, and filed in the Patent Office on November 30, 1908. Do you recall the circumstances connected with making and filing that affidavit?

A. I do not recall much of the circumstances at this time, but presume I knew them at the date of the affidavit as it was subscribed before me as notary public.

Q. 9. Who prepared that affidavit?

A. I believe the affidavit was prepared by Mr. Henry C. Townsend, the senior member of Townsend & Decker.

Q. 10. What makes you think that Mr. Townsend prepared it?

A. For the reason that Mr. Townsend had direct charge of the case at that time.

Q. 11. Where was that affidavit executed?

A. The affidavit was executed in New York City.

Q. 12. Was Mr. Adolph Rietzel present before you when it was subscribed and sworn to by him?

A. To the best of my knowledge he was.

Q. 13. State if you know from whom the data incorporated in this affidavit was procured?

A. The data I do not recall.

Q. 14. The affidavit in full reads as follows:

"MAIL ROOM
NOV 30 1908
U. S. PATENT OFFICE

IN THE UNITED STATES PATENT OFFICE.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:—

In the matter of the application of ADOLPH R. RIETZEL, filed Feb. 24th, 1905, S. N. 247,081 for Uniting Sheet Metal By Electric Welding.

AFFIDAVIT.

County of New York } ss
State of New York }

ADOLPH F. RIETZEL being duly sworn deposes and says that he is the applicant who filed the above entitled application for patent; that some time in June 1904 he successfully practised the invention in said application by uniting two halves of a sheet metal pulley in an electric welding machine at the shop of the Thomson Electric Welding Co., in Lynn, Mass.; that the piece of sheet metal herewith attached and marked: "specimen of pulley C. F. Tischner Jr., N.P." is a duplicate of one of the halves of the pulley to which he at that time applied the invention; that the contact points or projections formed in the sheet metal were in the first instance made by filing the metal to leave the contact points or projections, indenting not being available at that time, but that in subsequent operations in which his invention was employed the projections were made by indenting the sheet metal, and that the invention was frequently practised by him successfully at the shop of said Company on a standard welding machine; that in conducting the operations on such machines he employed a pair of contacts fitted in the jaws of the machine and formed at their outer ends so as to fit into the cup shaped portion of the halves of the sheet metal pulley to be welded, thereby supporting the two halves with the contact projections engaged with one another; the two halves being in contact by the projections while assembled in the machine, electric current was caused to pass through the two halves by the contact projections, and pressure was then applied in the usual way practised in electric welding by the standard machine in which the operation in question was conducted; the operations above recited as conducted by him were uniformly successful and demonstrated clearly that the invention was complete in

all particulars, and that the said invention has been since practised on innumberable occasions in substantially the same way for uniting pieces of sheet metal such as the halves of sheet metal pulleys of the form shown in the exhibit and of other forms and of other sizes, many of much larger size than that of the exhibit; that he does not know and does not believe that the invention aforesaid has been in public use or on sale in this country, patented or described in a printed publication in this or any foreign country for more than two years prior to his application and that he has never abandoned the invention.

ADOLPH F. RIETZEL.

Subscribed and sworn to by the aforesaid Adolph F. Rietzel before me this 23d day of October 1908.

C. G. TISCHNER JR
Notary Public.

(Seal) NOTARY PUBLIC, KINGS COUNTY,
CERTIFICATE FILED IN NEW YORK COUNTY."

Do you recall having seen the exhibit marked, according to the affidavit, "Specimen of Pulley, C. F. Tischner, Jr., N.P."?

(Objection is taken by Mr. Stackpole once and for all to all testimony concerning this affidavit as being irrelevant and immaterial.)

A. I cannot say that I do recall having seen it at this time.

Q. 15. Were you at this time identified with the prosecution of the Rietzel application aforesaid,—that is to say, did you have anything to do with its prosecution at that time?

A. As I now recall, I only had more or less of a superficial knowledge of the case at that time.

Q. 16. Do you know whether or not the specimen of pulley referred to was filed, as a matter of fact, in the Patent Office with the affidavit?

A. I cannot say of my own knowledge at this time that it was filed.

Q. 17. Did you ever see it on file in the Patent Office?

A. I did not.

Q. 18. Do you know what became of it?

A. I do not.

Q. 19. Is it not now in the custody of Messrs. Townsend & Decker?

A. Insofar as I know, it is not.

Q. 20. What has become of it?

A. I do not know.

Q. 21. I find in this file another affidavit of Adolph F. Rietzel reading as follows:

"MAIL ROOM U. S. PATENT OFFICE
Mar 13 1909 MAR 15 1909
U. S. PATENT OFFICE DIVISION 26

IN THE UNITED STATES PATENT OFFICE.

In the matter of the application for patent of Adolph F. Rietzel, S. N. 247,081, filed February 24th, 1905, for Electric Welding:

AFFIDAVIT.

County of New York } ss:
State of New York }

ADOLPH F. RIETZEL, being duly sworn, deposes and says, that he is the applicant that filed the above entitled application for patent;

That prior to the 18th day of February, 1904, he repeatedly, successfully practised the method of fastening two sheets of metal together face to face by welding them at spots in their meeting surfaces by confining the heating electric current passed from one plate to the other in such spots and localizing the welding pressure at said spots, as claimed broadly in said application;

That the work of so uniting such sheets of metal was done at the factory of the Thomson Electric Welding Company at Lynn, Massachusetts, on a Welding Machine of a commercial type known as type 10 A Welder;

That said machine was the same in construction as the machine known as type 5 A Welder but of larger size and was identical with that shown on the attached page removed from a catalogue of the Thomson Electric Welding Company, which page is identified and marked "Page of Catalogue, D. M. Edsall, N. P.";

That the accompanying pieces of work marked "Specimen No. 1, D. M. Edsall, N. P." and "Specimen No. 2, D. M. Edsall, N. P." are duplicates of work so done by him on that machine prior to the 18th day of February, 1904, but that the original specimens were not preserved;

That in doing such work he employed a pointed electrode, the same in form as the accompanying electrode marked for identification "Welding Electrode, D. M. Edsall, N. P.", which electrode was clamped in one of the holders of the machine and was used to apply the localized pressure and heating current to the plates which were welded together at spots in their superficial area, the opposite or backing electrode being a block of metal which was flat and of a superficial area, approximating the area of the plates which were welded together and which opposite electrode was clamped in the opposite holder of the machine;

That in this operation the two plates superposed upon one another were inserted between said electrodes and the pressure

and heating current localized as claimed were applied by forcing the pointed electrode against the outside face of the plates and pressing them between said pointed electrode and the opposite flat electrode, current being at the same time passed from one electrode to the other and pressure being applied by employing the usual devices forming a part of the machine and used in the ordinary operation of the machine for applying welding pressure to the work.

That work was repeatedly and successfully done in this manner upon various sizes and pieces of metal plates, none of which however, are now in existence so far as affiant has been able to discover;

That the work done by him as aforesaid, demonstrated the complete success of the operation and that metal plates could be successfully and firmly united together by distinct or isolated electric welds forming welded spots of union in their meeting faces and constituting in effect a successful substitute for a union of the same by a number of rivets.

ADOLPH F. RIETZEL

Subscribed and sworn to before me this 18th day of February, 1909.

DAVID M. EDSALL
Notary Public
N. Y. Co."

(Seal)

Do you recall the preparation and filing of this affidavit of Mr. Rietzel of February 18, 1909?

(Same objection is made by Mr. Stackpole with reference to this affidavit.)

A. I cannot now say that I recall the preparation of this affidavit.

Q. 22. State if you know who prepared it.

A. It is my impression that Mr. Townsend prepared it.

Q. 23. Are you sure that you did not prepare it?

A. I am positive that I did not prepare it.

Q. 24. Do you know independently of the record that such an affidavit was prepared and filed?

A. I do not.

Q. 25. Do you know what has become of the various exhibits referred to in this affidavit?

A. I do not.

Q. 26. Do you know whether or not they were in fact filed in the Patent Office?

A. Of my own knowledge I cannot say.

Q. 27. Do you recall having seen the page of catalogue that was annexed to the affidavit, a copy of which I now show you?

A. The cut in the catalogue is a familiar illustration to me, but whether I saw it at the time of its being annexed to the affidavit I cannot now say.

Q. 28. Do you recall the fact of the presence of Mr. Rietzel in New York at the time this affidavit was prepared?

A. I do not.

Q. 29. Is Mr. Henry C. Townsend, whom you think prepared both of these affidavits, now living, and if so, where is he?

A. He is now living and, to the best of my knowledge, is at 149 Broadway, New York City.

Signature waived.

No cross-examination.

Certificate waived.

IN THE DISTRICT COURT OF THE UNITED STATES

FOR THE

EASTERN DISTRICT OF MICHIGAN,

SOUTHERN DIVISION.

IN EQUITY

HARMATTA PATENT NO. 1,046,066.

THOMSON SPOT WELDER COMPANY, PLAINTIFF,

vs.

FORD MOTOR COMPANY, DEFENDANT.

Deposition of Henry C. Townsend, taken pursuant to notice and by consent in behalf of the Defendant at the office of Townsend & Decker, 149 Broadway, New York City, on the 30th day of October, 1918, before Mr. George E. Brown, Notary Public in and for the State of New York.

Present: J. L. STACKPOLE, ESQ., in behalf of Plaintiff.
MELVILLE CHURCH, ESQ., in behalf of the Defendant.

HENRY C. TOWNSEND.

HENRY C. TOWNSEND, being duly sworn, deposes and says in answer to interrogatories propounded to him by Mr. Church as follows:

Question 1. Please state your name, age and residence.

Answer. Henry C. Townsend; age 68; present residence Montclair, New Jersey.

Q. 2. You were at one time an Examiner in the Patent Office in charge of the class of electricity, were you not?

A. Yes.

Q. 3. When did you resign from the Patent Office?

A. In the Fall of 1880.

Q. 4. Since that time you have been engaged in the preparation and prosecution of applications before the Patent Office and specifically in the preparation and prosecution of applications for the Thomson Electric Welding Company, have you not?

A. Very largely until within more recent years when many of the applications have been prepared by my partner, Mr. Tischner.

Q. 5. You prepared the original applications of Elihu Thomson which resulted in patents Nos. 347,140 and 347,141, dated August 10th, 1886, covering the fundamentals of the art of electric welding, did you not?

A. Do you mean the specification and claims? They were, as to the specifications largely description furnished by Prof. Thomson, and as to the claims, I do not recall. I think I drew them, however; some of them.

Q. 6. You appeared as solicitor of record in those original Thomson cases, did you not?

A. Yes.

Q. 7. And they were assigned, were they not, to the Thomson Electric Welding Company?

A. That's all a matter of record. I don't know.

Q. 8. The work that you did for Professor Thomson in the way of preparing and prosecuting applications for patents on electric welding was paid for by the Thomson Electric Welding Company,

A. It was paid for personally by Prof. Thomson as I recall, but just what Company or what the title of the Company was or who the individual was that paid for the work I could not say positively without consulting records.

Q. 9. You have prepared and prosecuted applications for patents relating to electric welding for others than Elihu Thomson for the Thomson Electric Welding Company, have you not?

A. Yes.

Q. 10. I draw your attention to patent No. 928,701, granted July 20th, 1909, upon an application filed February 24th, 1905, for Uniting the Component Parts of Composite Sheet Metal Structures, and ask you whether or not you prepared and prosecuted the application for that patent?

A. I did most if not all the work on that case.

Q. 11. I notice that the sheet of drawings forming a part of this patent is signed thus: "Inventor Adolph F. Rietzel, by Townsend & Decker Attorneys." Were you a member of the firm of Townsend & Decker at that time?

A. The senior member.

Q. 12. Can you tell me when that firm was organized, approximately?

A. I cannot. It was many years prior to the filing of the application for Rietzel.

Q. 13. This Rietzel patent on its face appears to have been issued to the Thomson Electric Welding Company as assignee of Rietzel. Does it accord with your recollection that the application for this patent was assigned to the Thomson Electric Welding Company before the patent issued?

A. I have no recollection about those matters in detail.

Q. 14. Did the Thomson Electric Welding Company pay you for your services in the preparation and prosecution of this Rietzel application?

A. Yes.

Q. 15. I have before me a certified copy of the file wrapper and contents in the matter of the Rietzel patent No. 928,701 to which I have previously referred and from the disclosure of the application as originally presented I find that the only method or process specifically described and claimed consisted in the welding of sheets or plates of metal together at their plane surfaces by providing a multiplicity of contact points or spots between said surfaces, passing a heating electric current from one plate to the other through said points in multiple and applying pressure in a direction to form a number of points of welded union between said plates and sheets. Am I right about this?

A. That seems to be the case.

Q. 16. I also find that after a series of rejections on the part of the Patent Office followed, in turn, by a series of amendments on your part, a citation was made by the Patent Office Examiner in a communication of June 8th, 1908, of the British patent to Harmatta No. 22,981 of 1903, after which a new specification and claims were filed to wit: On November 30th, 1908, which considerably broadened the scope of the application so that it was made to cover, as for instance by claim 2 following:

> "2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected."

Do you recall the broadening of the application and claims thereof in view of this citation of the English patent to Harmatta?

A. I do not recall just how the broadening of the application came about. I generally study my cases while they are before the Patent Office and if it at any time occurs to me that the original claims are insufficient to protect the inventor in what he appears to have contributed to the art I endeavor to broaden the claims.

Q. 17. Well, you do recall the fact that this Rietzel application was broadened as to its claims?

A. Oh, yes.

Q. 18. I further find that when this broadened specification and these broadened claims were filed, and affidavit of Mr. Rietzel, verified October 23rd, 1908, was also filed and that in that affidavit Mr. Rietzel swore that he had successfully practiced the invention of his application some time in June, 1904, which date I understand was prior to the effective date of the Harmatta British patent which, though on its face dated in 1903, was not in fact issued as a patent until sometime in 1904. Do you recall these facts?

A. I recall the fact that an affidavit or affidavits were prepared for the purpose of overcoming the dates of the patent or patents set up against the Rietzel application and the Harmatta patent is the only one that I now recall as having required affidavit of priority such as required by the Patent Office or a rule thereof.

Q. 19. The rule of the Patent Office to which you refer is known as Rule 75, is it not, which reads as follows:

> "75. When an original or reissue application is rejected on references to an expired or unexpired domestic patent which substantially shows or describes but does not claim the rejected invention, or on reference to a foreign patent or to a printed publication, and the applicant shall make oath to facts showing a completion of the invention in this country before the filing of the application on which the domestic patent issued, or before the date of the foreign patent, or before the date of the printed publication, and shall also make oath that he does not know and does not believe, that the invention has been in public use or on sale in this country, or patented or described in a printed publication in this or any foreign country for more than two years prior to his application, and that he has never abandoned the invention, then the patent or publication cited will not bar the grant of a patent to the applicant, unless the date of such patent or printed publication is more than two years prior to the date on which application was filed in this country."

A. Just how the rule read at that time I don't recall. There was some rule of the same general import at the time but, as I understand, the rule has been frequently changed.

Q. 20. The rule that was involved at that time was to the same purport, was it not, as the one I have quoted?

A. I would infer that from the fact that an affidavit such as you refer to was filed.

Q. 21. It was customary, was it not, at that time, when filing an affidavit for the purpose of showing completion of the applicant's invention before the effective date of the patent cited against him, to not set up the exact date of applicant's completion of the invention but only a date that was prior to the date of the patent desired

to be anticipated? In other words, the applicant did not give away in his affidavit anything more than he was required to to satisfy the rule? Am I not right about this?

A. It was very common practice to so confine the affidavit as to date but I have known instances where inventors have shown their whole hand and gone further than the rule required. I presume that in this case the affidavit covered as to date what has been my usual practice to allege,—the date prior to the legal date of the reference as an anticipation.

Q. 22. Please examine this affidavit of Rietzel's verified October 23rd, 1908, and state whether you prepared it?

A. I have no means of telling. If I do not personally prepare it I directed that it be prepared and embody the facts as furnished by the inventor.

Q. 23. Who did furnish the facts embodied in this affidavit?

A. I presume the inventor or the Company. I don't recall from whom the facts came directly.

Q. 24. Would you give us the impression that you do not recollect anything about the preparation of this affidavit?

A. I only remember that an affidavit of that character was filed and prepared on information furnished on behalf of the inventor or the Company. Whether I personally dictated or drafted that affidavit I cannot say because I do not recall having personally done so. If I did not draw it I supervised the drawing of it and approved it.

Q. 25. And before filing the affidavit you were satisfied with the facts alleged therein from the evidence brought to your attention?

A. I drew the affidavit or had it drawn to embody the facts furnished by the inventor and I left it to the Patent Office to decide whether it was sufficient to accomplish the purpose of overcoming the reference.

Q. 26. Did you go to Lynn and confer with Mr. Rietzel and examine such evidence as he had substantiating the statements of this affidavit before approving the affidavit?

A. Not that I recall. My first impulse when you started the question was to say no, that I did not.

Q. 27. Did you ever meet Mr. Rietzel?

A. Oh, yes.

Q. 28. Where?

A. In this office and sometimes in Lynn.

Q. 29. In those days you not infrequently went to Lynn, is that not a fact?

A. I should say infrequently.

Q. 30. You had a good deal of work for the Thomson Electric Welding Company at that time, had you not?

A. Yes, but I sought to put much of the disagreeable labor and burden on others.

Q. 31. You recall having met Mr. Rietzel at your office in New York?

A. Yes.

Q. 32. Do you not think it probable that he was in New York

when this affidavit of October 23rd, 1908, was prepared and brought with him the specimens that are referred to in the affidavit?

A. He must have brought or sent the specimens but whether he was here when the affidavit was prepared I do not recall.

Q. 33. At all events, you satisfied yourself that the facts were as represented in this affidavit before you filed the affidavit? Am I not right about this?

A. I took the inventor's statement on the subject. I did not make any investigation of any records or archives of the inventor or his Company.

Q. 34. Did you confer at all with anyone else than Rietzel about the subject of this affidavit? If so, with whom?

A. You mean with reference to the facts set forth?

Q. 35. Yes.

A. No, not that I recall. I may have talked the thing over with someone in my office but not with anybody representing the Company or the inventor apart from myself or my assistant.

Q. 36. This affidavit of October 23rd, 1908, refers to the union "of two halves of a sheet metal pulley in an electric welding machine at the shop of the Thomson Electric Welding Company in Lynn, Mass., and to "the piece of sheet metal herewith attached and marked 'Specimen of Pulley, C. F. Tischner, Jr., N. P.,' as" a duplicate of one of the halves of the pulley to which he at that time applied the invention". Do you recall the specimen here referred to?

A. I recall there having been a specimen in this office of a pulley of that character and I think that the specimen must have been filed in connection with that affidavit. It is difficult to recall these matters of detail after this whole lapse of time. My best recollection is that such a specimen was used.

Q. 37. Will you please describe that specimen according to your best recollection of it. Tell us what it showed?

A. About all I recall of that specimen is that it was a small pulley made up of two halves of sheet metal secured together at intervals at the hub or near the center but you should understand that the pulley and the only pulley I am able to visualize now, may or may not have been the pulley used as an exhibit because from time to time we have had different specimens of that character about my office. As to that particular exhibit, while I am satisfied that one was filed and that it in some way answered to the statements in the affidavit, my recollection as to the exact construction is rather hazy.

Q. 38. You have no doubt, have you, that the affidavit correctly described the specimen that was annexed to it?

A. No.

Q. 39. Where is that specimen?

A. I do not know.

Q. 40. Did you ever withdraw it or cause it to be withdrawn from the Patent Office?

A. I don't recall having done anything about withdrawing that exhibit.

Q. 41. And so far as you know it is now in the Patent Office on file?

A. Yes.

Q. 42. On December 14th, 1908, the record shows, two French patents of Egel Nos. 336,187 and 335,889 were cited to the broad claims of Rietzel. The first of these Egel patents to wit: No. 336,187 was dated October 13th, 1903, published as of the 1st day of March, 1904, and granted as of the 7th day of January, 1904, was it not?

A. The record will show.

Q. 43. And the disclosure of this Egel patent 336,187 is identical with the disclosure of the Harmatta British patent, is it not?

A. I don't know.

Q. 44. Did you never investigate this?

A. I may have but I don't see any reason why I should compare these two patents for the purpose of ascertaining whether they were identical or not. All I can say is that I do not recall about that.

Q. 45. At all events, the citation of this Egel French patent 336,187 called for and required another antedating oath from Rietzel, did it not, in order that the date of the completion of his invention might be carried back of the date of the Egel French patent so as to enable Rietzel's patent to be granted?

A. As I recall, it was necessary to overcome the date of the Egel French patent and that we had to do that by an affidavit.

Q. 46. In the "REMARKS" annexed to a letter that you wrote to the Patent Office under date of March 3rd, 1909, which was received and filed in the Patent Office March 13th, 1909, you state "We file herewith an affidavit establishing completion of the invention on applicant's part prior to the dates of the French patents cited by the Examiner in his last official letter." Does this refresh your recollection as to the reason for filing this additional Rietzel affidavit on February 18th, 1909?

A. No, I remember it independently of any quotation you may make from a letter you may find in the record.

Q. 47. Now referring to this affidavit of Mr. Rietzel of February 18th, 1909, I note that it says:

> "that prior to the 18th day of February, 1904, he repeatedly successfully practiced the method of fastening two pieces of metal together face to face by welding them at spots in their meeting surfaces by confining the heating electric current passed from one plate to the other in said spots and localizing the welding prepared at said spots, as claimed broadly in said application."

Further on in the affidavit I find this description:

> "that in doing such work he employed a pointed electrode, the same in form as the accompanying electrode marked for identification 'Welding Electrode, D.M. Edsall, N.P.,' which elec-

trode was clamped in one of the holders of the machine and was used to apply the localized pressure and heating current to plates which were welded together in their superficial area, approximating the area of the plates which were welded together and which opposite electrode was clamped in the opposite holder of the machine; that in this operation the two plates superposed upon one another were inserted between said electrodes and the pressure and heating current localized as claimed were applied by forcing the pointed electrode against the outside face of the plates and pressing them between said pointed electrode and the opposite flat electrode, current being at the same time passed from one electrode to the other and pressure being applied by employing the usual devices forming a part of the machine and used in the ordinary operation of the machine for applying welding pressure to the work; that work was repeatedly successfully done in this manner upon various sizes and pieces of metal plates, none of which however, are now in existence so far as affiant has been able to discover; that the work done by him as aforesaid, demonstrated the complete success of the operation and that metal plates could be successfully and firmly united together by distinct or isolated electric welds forming spots of union in their meeting faces and constituting in effect a successful substitute for a union of the same by a number of rivets."

This description contained in the affidavit, of what was done by Mr. Rietzel prior to the 18th day of February, 1904, is and was intended to be a description of what we now know as spot welding, is it not?

A. It was intended to be a description which would establish the fact that the inventor had, prior to a certain date, practiced some process upon which the claim rejected would be founded. If the process claimed was spot welding I suppose the description of the affidavit could be said to describe spot welding.

Q. 48. You prepared this affidavit of February 18th, 1909, did you not?

A. Parts of it sound like my dictation.

Q. 49. Have you any doubt that you prepared it?

A. I am not sure that I did. My doubt would be as to whether I did or not. I couldn't say that I have no doubt. I could say from the fact I mention that I probably did, or at any rate, parts of it.

Q. 50. The affidavit at least met with your approval and was not filed until approved by you. That's correct, isn't it?

A. Yes.

Q. 51. And was intended to set forth a reduction to practice by Rietzel of a process of electric welding of sheets or plates of metal that did not have projections upon them?

A. I don't recall that. I should say that there was no intention to describe the process as one in which projections were excluded from the practice of the process as related in the affidavit. The intent was simply to furnish an affidavit to the Patent Office that would satisfy

the Examiner under the rule and procure the allowance of the application.

Q. 52. Will you please take this affidavit of February 18th, 1909, and read it carefully from beginning to end and state if you find therein any description of the welding together of plates that were provided with projections at the points of welding.

A. I find no statement on the subject.

Q. 53. You are familiar, are you not, with modern spot welding, so-called?

A. So far as disclosed in patents I might be said to be reasonably familiar wth it.

Q. 54. Have you never seen spot welding practiced?

A. I don't recall any instance at present.

Q. 55. Will you please state how you understand the modern process of spot welding to be practiced where employed for the union of thin plates or sheets of metal?

A. The best description of that process would be for me to take the Harmatta specification and quote from it.

Q. 56. I would prefer your own language. Please give me a short description of the process of electrically uniting thin plates or sheets by the so-called spot welding process.

(By Mr. Stackpole: Objected to as irrelevant and incompenent.)

A. I am not a welding expert so far as actual practice goes and I am not an expert in any sense excepting in the very limited sense that I have related. I don't care to spend my time in endeavoring to formulate what I would consider a just and exact statement of what spot welding is or just how you would proceed to satisfy the definition of spot welding.

Q. 57. Did you prepare or have any part in preparing the ultimate specification and claims of the Harmatta patent 1,046,066 as they appear in the patent issued?

A. Yes.

Q. 58. Did you prepare the ultimate specification and claims?

A. Yes.

Q. 59. I now show you a copy of the Harmatta patent which is the patent here in suit and ask you to select and quote upon the record any claim therein that you think is fairly descriptive of what is known as spot welding to-day.

A. I do not think I should be called upon to select a claim of this patent which would be suitable for the owners thereof to use as a claim against an infringer in the spot welding art, nor do I think I should be called upon to express a view on this subject under any circumstances unless based upon some material exhibit or some particular procedure as practiced and witnessed by me, or as described by someone who has seen the infringing process performed. I am not on the stand here to act as a so-called patent expert or as

a spot welding expert and I object to my time being taken up by questions of this nature.

Q. 60. Coming back to the affidavit of Rietzel dated February 18th, 1909, was it not your intention in drawing that affidavit to show that Rietzel had, prior to the date of French patent to Egel, to wit French patent No. 336,187, reduced to practice the process of electric welding disclosed in said Egel patent?

A. I should say, without endeavoring to put my mind now back into the frame in which it might have been at that particular time or on that particular occasion, that the intent was to show that Mr. Rietzel had practiced the invention of the claim or claims rejected on Egel prior to the legal date of Egel. The Examiner seemed to think that Egel anticipated and, as I recall, was very strongly of that opinion, and without endeavoring to disabuse him on that idea, the easiest way or the natural way under many cases and in this case perhaps, was to simply file an affidavit as to the fact and so dispose of the whole matter.

Q. 61. This affidavit of February 18th, 1909, refers to a specimen of work, annexed to and furnished with it, in the following language:

> "that the accompanying pieces of work marked 'Specimen No. 1, D. M. Edsall, N.P.' 'Specimen No. 2, D. M. Edsall, N.P.' are duplicates of work so done by him on that machine prior to the 18th day of February, 1904, but that the original specimens were not preserved".

Do you recall those specimens of work?

A. I think I do.

Q. 62. What did they show? Describe them?

A. They showed two plates of metal, I should think about two inches long on the side, one of them at least, which is the only one which I clearly recollect, and that is the one about which I am making the statement, and those two plates were apparently fastened together and by what was said to be a weld on their opposing surfaces. They may have been in thickness some fraction of an inch, I should say less than a quarter, but just what the measurement of thickness would be expressed in fractions of an inch, I could not say as I am unaccustomed to measuring things by the eye in fractions of lineal measure.

Q. 63. Were those specimens filed in the Patent Office with the affidavit?

A. I suppose they were. It was my intention to have them filed.

Q. 64. Do you know where they are now?

A. I do not.

Q. 65. Did you withdraw them or cause them to be withdrawn from the Patent Office?

A. Not that I recall.

Q. 66. Have you ever made a search for them at the Patent Office to see whether they are there?

A. No.

Q. 67. Has any one to your knowledge made a search for them to that purpose?

A. I think Mr. Tischner stated that he had made a search.

Q. 68. With what result?

A. The only statement that I recall on the subject is that they were not there.

Q. 69. Mr. Tischner is your present partner?

A. Yes.

Q. 70. And his full name is Mr. C. F. Tischner?

A. Yes.

Q. 71. And was formerly known as C. F. Tischner, Jr.?

A. Yes.

Q. 72. At how many spots were these specimen sheets or plates welded?

A. When you first asked me about this specimen I thought I recalled that it was fastened at one spot only but as you revive the subject it seems to me that there were several places where the plates were secured together.

Q. 73. In view of the fact that the affidavit in its second paragraph speaks of the affiant having "successfully practiced the method of fastening two sheets of metal together face to face by welding them at spots in their meeting surfaces," and in view of the further fact that the affidavit refers to the specimens as duplicates of those that had been so produced by the affiant, are you not mistaken in your inference that the specimens were anywhere near a quarter of an inch in thickness? Must they not have been very much thinner than a quarter of an inch?

A. I might be mistaken. It was a long time ago.

Q. 74. Well now, the affidavit also refers to an "accompanying electrode marked for identification 'Welding Electrode, D. M. Edsall, N. P.'" Do you recall what that looked like? If so, describe it to us.

A. All that I remember about that is that it was a piece of metal. The kind I do not recall—it might have been two or three inches long; the thickness I am very hazy about; and there was a sort of a taper towards one end which somewhat narrowed the extreme end to make it smaller than the reverse end. The dimensions I will not undertake to say what they were excepting in a most general way, to say that the piece of metal was not an inch in diameter as I know an inch.

Q. 75. Can you say that that electrode was not of copper?

A. No.

Q. 76. You think it was of copper, don't you?

A. I have no recollection.

Q. 77. It probably was of copper, was it not?

A. Why, so far as I know the art, I should say it probably was of copper.

Q. 78. Do you know what has become of that electrode?

A. No.

Q. 79. Did you ever make search for it or cause search to be made for it at the Patent Office?

A. Not that I recall.

Q. 80. Did Mr. Tischner ever try to find it in the Patent Office?

A. He told me at one time that he had looked for these Rietzel exhibits filed in connection with the affidavits and that they could not be found. That is all that I know about their existence.

Q. 81. The effect of the filing of this affidavit of February 18th 1909 by Rietzel was the short-circuiting, so to speak, of the Egel French patents, and the Harmatta British patent, and the granting of the patent to Rietzel with broad claims covering both the Egel disclosure and the Harmatta disclosure and that was the intention was it not?

A. Yes, as I recall the circumstances, although perhaps I will not adopt your term of "short-circuiting."

Q. 82. The Rietzel patent issued July 20th 1909 and thereafter, to wit: on April 14th 1910, it was put in interference with a United States application of Harmatta filed December 3rd 1903, was it not?

A. The record will show.

Q. 83. When and under what circumstances did you first learn of the existence of this Harmatta United States application?

A. I don't recall.

Q. 84. Did you know of it before the interference between Harmatta and Rietzel was declared?

A. I think so.

Q. 85. How did you learn that?

A. I don't recall when first. The record may show something about it.

Q. 86. From what source did you receive your first information of the existence of the United States application of Harmatta?

A. I do not recall, Mr. Church. You might possibly refresh my recollection.

Q. 87. I have before me a certified copy of the record and proceedings in the matter of the interference between Rietzel and Harmatta, the same being Interference No. 31,792. In that interference Rietzel filed a preliminary statement verified June 7th 1910, in which he said "that he conceived the invention set forth in the declaration of interference during the latter part of October or first part of November 1897; that as near as deponent can at this time fix the date, the invention was successfully reduced to practice the latter part of July 1898 and at the same time was first explained and disclosed to others." Did you prepare that statement for Mr. Rietzel's execution?

A. I do not recall. If I did not it was prepared at my direction to embody the information furnished by the inventor or his Company.

Q. 88. Who did furnish the information as to the facts set up in this preliminary statement, Mr. Rietzel or Thomson Electric Welding Company or both?

A. I don't recall through just what channel they reached us.

Q. 89. All the work done by you on the Rietzel application was done in behalf of Thomson Electric Welding Company and paid for by that Company, was it not?

A. Yes.

Q. 90. Who connected with that Company were you in closest touch with regarding the applications which you were handling for that Company?

A. That is hard to say. Descriptions, as I recall, at that time were frequently sent by the executive officers of the Company. Sometimes Mr. Rietzel in the case of his inventions may have sent them himself. In case of other inventors I would say that they generally came direct.

Q. 91. Who was the officer of the Company with whom you did business, if with anyone?

A. William H. Hodges, who was Secretary of the Thomson Electric Welding Company.

Q. 92. I note that in the statement of Harmatta filed in this interference Rietzel vs. Harmatta, he refers to French patent No. 336,187 as embodying his invention and also to English patent 22,981 of 1903, published October 20th 1904 and granted August 25th 1904 as embodying his invention. On the face of the preliminary statements of the respective parties Rietzel was the prior inventor, was he not, of the subject-matter of the interference?

(By Mr. Stackpole: Objected to as calling for an inference of law.)

A. I think he set up earlier dates than the other parties

Q. 93. Your partner, Mr. C. F. Tischner, Jr., during the pendency of the interference between Rietzel and Harmatta, went to Europe and purchased the Harmatta application, did he not?

A. Yes.

Q. 94. And thereafter Rietzel, having defaulted in the taking and filing of testimony to establish his claimed date of invention, judgment went against him on the record and in favor of Harmatta? Is this not so?

A. I believe the record shows that fact.

Q. 95. And thereafter you revised the Harmatta application, rewriting the specification and claims, and then the Thomson Company had the Harmatta patent issued to itself as assignee of Harmatta? Is this not so ?

A. The record shows as to the major portion of your question, I suppose. As to my personal act in preparing the specification and claims for Harmatta, it is my impression that I did so. Whether the final form was wholly mine I could not state positively although on reflection I am sure that it received my approval.

Q. 96. In your rveision of the Harmatta application before permitting it to go to patent, you transferred to it many of the method

or process claims and all of the article claims of the Rietzel patent, did you not?

A. Yes, the record shows that.

(By Mr. Stackpole: Objection is taken to the entire deposition as irrelevant and immaterial and calling for hearsay testimony and for secondary evidence.)

Deposition closed.

Signature and certificate waived.

UNITED STATES DISTRICT COURT.

EASTERN DISTRICT OF MICHIGAN—SOUTHERN DIVISION.

THOMSON SPOT WELDER COMPANY, Plaintiff

vs.

FORD MOTOR COMPANY, Defendant.

IN EQUITY.

DEPOSITION OF ADOLPH F. RIETZEL, taken in behalf of the defendant, at the office of GEORGE FARNELL, 1314 Turks Head Building, Providence, Rhode Island, on the 6th day of January, 1919, beginning at 10 o'clock a. m., before GEORGE FARNELL, a NOTARY PUBLIC in and for the county of Providence and State of Rhode Island, pursuant to the annexed notice.

Present: J. L. STACKPOLE, ESQ., for the plaintiff.
ALEXANDER S. STEUART, ESQ., HENRY H. SNELLING, ESQ., for the defendant.

ADOLPH F. RIETZEL.

ADOLPH F. RIETZEL, having been duly sworn, deposes and says, in answer to questions by Mr. Steuart, as follows:

Question 1. Please state your name, age, residence and occupation?

Answer. Adolph F. Rietzel; fifty-five years old; occupation, mechanical and electrical engineer; residence, Charlestown, Rhode Island.

Q. 2. By whom were you last previously employed, if by any one?

A. By the Universal Electric Welding Company.

Q. 3. During what period were you employed by the Universal Electric Welding Company?

A. From August 1907 until November 1917.

Q. 4. Prior to such employment by whom were you employed?

A. By the Thomson Electric Welding Company, Lynn, Massachusetts.

Q. 5. How long were you employed by the last mentioned Company, and what were your duties?

A. I was employed by them from August 1888 until the 21st of June, 1907. During that period I was foreman, superintendent, engineer, manager and practically at one time conducted the whole business except that pertaining to the leases, which I could not sign, not being an official of the company.

Q. 6. Are you, and were you at the time of your last mentioned employment, a practical electrician as well as an electrical engineer?

A. As far as it pertains to electric welding matters I am and was.

Q. 7. Please give briefly what experience you have had as an electrical welder?

A. Well, I started in as foreman of the instrument department and from there was made foreman of the winding department and then the testing department was put under my charge, then I was made foreman of the entire machine shop and later had charge of the experimental department, after that was given charge of the engineering department, and finally was on the road to sell the electric machines, all for the Thomson Electric Welding Company.

Q. 8. In the performance of your work were you in the habit of operating electric welding machines yourself for any purpose, experimental or otherwise?

A. I was.

Q. 9. Are you the same Adolph F. Rietzel who filed an application for patent in the United States Patent Office on the 24th day of February 1905 (Serial No. 247,081) for improvements in uniting the component parts of composite sheet metal structures, which application resulted in United States Patent No. 928,701, dated July 20, 1909, a copy of which I now show you?

A. I am.

Q. 10. Your patent No. 928,701, or at least Claims 1, 2, 3, 4, 5, 6, 16, 17, 18, 19 and 20 thereof, was at one time in interference with the application of Johann Harmatta filed December 3, 1903 (Serial No. 183,677), for improvements in electric welding, which Harmatta application resulted in United States Patent No. 1,046,066, dated December 3, 1912, a copy of which I now show you was it not?

A. Yes, I believe it was in interference.

Q. 11. In that interference you filed a preliminary statement verified June 7, 1910, and a supplemental preliminary statement verified August 21, 1911, in which you stated that you had conceived the invention set forth in the declaration of the interference during the latter part of October or first part of November 1897, and that as near as you could at the time fix the date, you successfully reduced that invention to practice in the latter part of July 1898. Please describe what you did in the latter part of July 1898 in the

way of reducing the invention to practice, as stated in your preliminary statement.

A. I think it was in July 1898 that I joined together several pieces of steel the dimensions 1 3/4 inches wide and 1/8 inch thick. I first joined these pieces together by lapping the ends over one another about 3/8 of an inch. I then placed them between the electrodes of an electric welding machine and welded them together across the whole section at one time, in other words, making one weld. This, however, did not answer the purpose which I had in mind. I then prepared an electrode one end of which was reduced to a diameter of about 3/8 of an inch. This electrode or contact as it is usually called was clamped on one of the electrodes of the welding machine, the other electrodes being flat and having a contact area of 3/4 of an inch by 1 3/4 inches. The two pieces of steel which were 1 3/4 inches wide, 1/8 inch thick, were placed between the aforesaid electrodes lapping over one another about 1/4 of an inch. I then welded these two pieces together at different points across the surface of the pieces as I remember. I think there were about five spots welded on the pieces; in other words, the difference between this specimen and the first one mentioned was that the first one was welded entirely across the whole surface of the pieces while the second specimen was only welded in spots. I welded a number of specimens like the second one referred to, that is, the one welded with spots only.

Q. 12. Please state whether or not it is a fact that the meeting faces of the overlapped portions of the metal referred to in your last answer, were plane smooth faces?

A. They were.

Q. 13. Then the sheets of metal acted upon were united by pressing them together and at the same time passing the heating and welding current from one to the other at a spot on their meeting surfaces which was restricted in area throughout the operation so as to leave on the meeting faces a well defined and comparative extensive area of no union completely surrounding said spots, were they not?

A. Practically so.

Q. 14. If this statement is inaccurate in any respect, please point it out?

A. I think it is correct.

Q. 15. Your said early work involved a method of welding two plates or sheets of metal together face to face between electrodes, consisting in restricting the area of contact of an electrode with said plates to a spot, passing a heating electric current from said electrode to the cooperating electrode through said spot to heat the work to welding temperature and applying pressure to the work in line with said spot to effect the welding of one plate to the other, did it not?

A. Well, as far as I could see, I should say yes.

Q. 16. The product or article produced in your aforesaid early work consisted of metal plates fastened together by a number of

distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic conditions and the spots on the meeting surfaces being separated from one another by distinct unwelded areas, did it not?

A. It did.

Q. 17. All of this work that you have been speaking of took place and constituted the successful reduction to practice in the latter part of July 1898, as referred to in your preliminary statement, did it not?

A. It did.

Q. 18. When and to whom did you first disclose your invention as referred to in your previous testimony?

A. As far as I can remember, I am quite sure that I showed the pieces or the specimens that I welded to some of the employes in the welding department at that time. I can't state positively the names of the employes, but I am quite sure that I showed it to some of them.

Q. 19. Please give the names of some to whom you think you showed it.

A. I think I showed it to a Mr. Clark, or possibly—Robert Clark—and I think I showed it to a Mr. Charles Osgood. I can't recall any others, at that particular time.

Q. 20. What sort of a welding machine did you use?

A. It was one of an old type 10-A cast secondary type of the Thomson Welding Company, one of their regular butt welders.

Q. 21. Please describe its construction.

A. It was termed a type 10-A which signified that it had a kilowatt capacity of 10,000 watts. It was a horizontal type the frame being composed of cast iron having a bed, two side standards and a table. The transformer was composed of a secondary made of copper cast in one piece. The top of this secondary was flat and mounted on each end of the secondary was what we term platens, the left hand one of which was stationary, the right hand one of which was movable toward the left hand one, or away from it, movement being given to the right hand one by means of a lever attached to a toggle joint by means of which the pressure was applied to the work being operated upon. These platens were provided with suitable clamping or holding devices to suit the work to be operated upon. The secondary on its sides was grooved, and in these grooves or troughs the primary coils were placed and an iron core laminated was passed through a rectangular hole in the secondary.

Q. 22. Where is the machine now, if you know?

A. I do not know.

Q. 23. Were machines of this kind a regular product and made in any number by the Thomson Electric Welding Company?

A. They were.

Q. 24. Who made or prepared the electrodes used in this ma-

chine to perform the spot welding referred to in your previous testimony?

A. I can not say who made them, but they were some that we had in the welding department and used on various machines for various kinds of work. One of the electrodes that I used, which was the flat one, was a standard contact, as we term them, and could be used in various welding machines. The other contact, the one on which one end the area of contact surface was quite small in comparison with the other one, was one that we had used for a special job of welding work we had been doing, and I can not state who made this particular contact.

Q. 25. By contact, you mean electrode, do you not?

A. At that time the contacts above mentioned were not referred or called electrodes but presumably that is what it was.

Q. 26. In what respect did it differ from what we now know as the electrodes in a spot welding machine?

A. Why, this contact did not form a part of the welding machine, that is, not a fixed or even a removable part, but was simply clamped on top of another contact which was a part of the machine, in other words, the contacts I refer to were simply loose pieces of copper clamped on the terminals of a secondary but did not form an actual part of the welding machine.

Q. 27. Will you please describe, with as much particularity as you can, just the shape, dimension, and material of both the pointed and the flat contacts?

A. The flat contact was made of pure copper and was 1¾ inches wide, about 2½ inches long, and ¾ inch thick. The pointed one was about 2½ inches long, 1¼ inches square, one end of this contact was reduced about ¾ inch from its end to a diameter of about ⅜ inch round, the reduction being gradual from the ⅜ diameter back ¾ inch to the 1¼ diameter. In the end of this contact, the reduced end, a hole was bored about 3/32″ (three thirty seconds of an inch) in diameter and about ⅝ of an inch deep. This contact was also of pure copper.

Q. 27. Has any of the early work, spot welded as described by you, been preserved?

A. Not that I know of.

Q. 28. When did you last see any of it?

A. Do you mean that that I did in July, 1898?

Q. 29. Yes, or what was done by any one else at about that time?

A. I don't remember when I did see any of it last. I can not say.

Q. 30. What has become of it so far as you know?

A. Probably been scrapped.

Q. 31. Under whose instructions was the electric welding done in the manner described by you?

A. It was done by myself.

Q. 32. How often did you do it?

A. Why, I can't say how often. When I had a little leisure time

I used to do more or less experimenting for welding various things in the welding department. I couldn't say now at this time how often I did work of that nature. I can only recall one instance where I tried to join two pieces of steel about ⅛ inch thick in the same manner as described in my previous testimony, which I believe I did either in September or early October of the same year, 1898. That is all I can recall just now.

Q. 33. How, if at all, did you test the welds made in accordance with that process, to see if they were good welds?

A. By trying to pry the joint apart with the aid of a chisel and a hammer, also by clamping the pieces joined in a vise, clamping it as near to the welded portion as possible, and then trying to break it apart by bending it back and forth with a large hammer.

Q. 34. As a result of these tests were they shown to be good welds?

A. They appeared so.

Q. 35. How early was the spot welding of plane plates not provided with projections on either of their meeting faces, an established practice in the art, to your knowledge?

A. I don't believe I can give any definite time and date but I think it was three or four years after, or more, than when I made the first specimens. In fact, I only can remember of doing some commercial work, I think it was in the year 1906. There may have been some previous to that time but I can't recall now.

Q. 36. What concern, to your knowledge, first put out machines for spot welding plane plates?

A. That I can not say. To my knowledge I don't know what concern did.

Q. 37. You do know, do you not, that such machines have been manufactured and marketed?

A. I do.

Q. 38. When did you first learn of this fact?

A. As near as I can remember, I think it was some time in 1910.

Q. 39. What was the commercial work that you spoke of doing in the year 1906?

A. The welding of steel ferrules such as used on the end of rake and hoe handles.

Q. 40. How extensively was this practiced?

A. As I remember the first machine built by the Thomson Electric Welding Company was made in the year 1906, or it might have been the early part of 1907. This machine was shipped about that time and put into commercial use, and shortly after this machine was shipped, more followed.

Q. 41. Please describe its construction with respect to the electrodes and the means for clamping the work between the electrodes, if it embodied the latter feature.

A. This machine was known as the punch press type, as its construction was similar to that of an ordinary punch press, such as is used for punching various kinds of blanks and other kinds of

work of that nature. It had the usual cast iron frame, the bed of which was stationary, the upper portion was provided with cast iron ways into which was mounted movably a cast iron slide, which was operated vertically up and down by an ordinary crank shaft. A spring, however, was inserted between the throw of the crank and the side. The purpose of this spring when compressed was to apply the pressure necessary for welding the parts to be operated on. The machine had mounted in its frame an electric welding transformer of the flexible secondary type. On the bed of the machine was a copper plate, grooved; to this plate was fastened one of the terminals of the flexible secondary. In this grooved plate was a copper slide which moved laterally and operated automatically by a series of levers. This slide carried an electrode, the size of which was practically of the length and diameter of the inside of the ferrule. On this electrode the ferrule was clamped by suitable holding devices, but in this case the ends or the joint of the ferrule did not overlap each other, the ends simply butted each other. The cast iron slide carried a copper casting to which was fastened the other end of the flexible secondary. In the casting was clamped an electrode about 1 inch in diameter tapered at one end to about 3/8 inch diameter. Suitable circuit closing and circuit breaking devices were attached or formed a part of the machine, the operation being that when a foot treadle was depressed the machine would start in motion, the slide coming down and the round or pointed electrode meeting the lower electrode, between which electrodes the work was. The aforesaid spring was compressed at the same time the current turned on, the weld being completed, the circuit was broken and the slide returning to its place automatically moved forward to the next position for welding, and the operation thus continued. I want to make plain that in this particular work the ends of the pieces being welded were not lapped, neither was there any space between the points welded, so that when the article or ferrule was completed there was a weld practically along its entire length or joint.

Q. 42. In the case of this particular commercial work I understand then that successive spot welds were formed, but that they were so close together as to make practically a continuous line of welds. Is that correct?

A. That is correct.

Q. 43. Going back to the machine and the electrodes as you say you used in 1898, what was the object of the hole which was formed in the pointed electrode?

A. There was no object in it. It was in that particular contact which had been used for another purpose, and as this contact was about of the shape that I wanted to use in my experiments, and I did not want to make a new one, I used this one.

Q. 44. What was the purpose for which it had been used?

A. It was used for welding some small parts of, I believe, a sewing machine, one part of which was a steel punching about 1/6

inch thick on one end of which we welded a small stud. This stud had a small projection on one end and the other end was another projection of about 3/8 inch. The hole in the contact was used to locate the stud in its proper position for welding to the punching.

Recess for lunch.

A. F. RIETZEL
THOMSON SPOT WELDER COMPANY
vs.
FORD MOTOR COMPANY
Defendant's Exhibit
Rietzel Sketch

Afternoon session:

Q. 45. Still referring to this machine and electrodes, which you say you used in 1898 to do spot welding, I note in your full answer that you speak of the plates being overlapped only 1/4 of an inch. The electrodes which were pointed you say was 3/8 of an inch in diameter. This would mean that the electrode projected beyond the overlap, have you any explanation of this?

A. Your assumption is not right. The pointed electrode can be placed, if desired, so that its outer edge would be even with the edge of the piece on which it lays, or can even be further back if necessary, as long as you keep enough metal between the two electrodes. I could perhaps make this more clear, I believe, with a sketch.

Q. 46. That is a good suggestion, and I would ask that you make a sketch showing the overlapped pieces of sheet metal and the electrodes sufficiently to indicate the relative sizes?

A. I have made a sketch and describe it as follows: Fig. 1 is a front elevation showing two pieces of metal one overlapping the other and one of the plates resting on a flat contact, the other piece of metal laying on top of that one, and the pointed electrode resting on the top plate so that the edge of the electrode is on the edge or comes in contact with the edge of the top piece. Fig. 2 is a plan view of the pieces operated on showing where the welds were made.

Q. 47. Does this sketch represent substantially what you did in 1898 and referred to in your foregoing testimony?

A. It does.

The sketch made by the witness is introduced in evidence and marked "Rietzel Sketch."

Q. 48. Who prepared your preliminary statements filed in the Rietzel-Harmatta Interference No. 31792?

A. Townsend & Decker, New York City, New York.

Q. 49. Who furnished the data for the preparation of the statements?

A. I did.

Q. 50. Where was the statements prepared?

A. I am not sure whether they were prepared at the office of the Thomson Electric Welder Company or at the office of Townsend & Decker.

Q. 51. Was the machine or any of its product in existence at the time the preliminary statements were prepared?

A. I can not say as to that.

Q. 52. How is that?

A. Because I don't know whether the machine was still at the factory of the Thomson Company, or whether it was sold, or scrapped.

Q. 53. How about any of the product?

A. I do not know what became of them.

Q. 54. Who prepared the application for your patent No. 928701?

A. Townsend & Decker.

Q. 55. Where was it prepared, and who furnished the data?

A. I believe it was prepared in the office of Townsend & Decker, and all information thereto was furnished by me in person.

Q. 56. Was the original machine or the product of such machine in existence at the time of the preparation of the application?

A. I can not state positively as to the machine, but as to the product I know that it was not in existence, or at least I could not find it.

Q. 57. I notice that this application was filed in February, 1905, and illustrates in its drawings more particularly the formation of spots welds by the use of projections between the proximate faces of the sheets. Do you know of any reason why you did not mention in the application for this patent the spot welding of sheets without projections between the proximate faces?

A. Well, I might explain that by saying that at that time, that is, the period between 1896 and 1904 it was not the policy of the Thomson Electric Welding Company to apply for patents of any kind until such time as they had, or would expect in the immediate future, to receive an order for an electric welding plant for any particular or special purpose before applying for patents and as during the period between the fall of 1897 and the year 1904 we did not receive or have any problems put up to us by which use might be put to some of those experiments which I did in 1898 as regards the welding in spots, but in 1904 we had occasion to apply on a particular class of work the method of raising projections on the work to be operated on. As this proved highly successful at the very start it was decided to make application for patents on this subject-matter.

Q. 58. In the file wrapper of the application for your patent No. 928701, I notice an office letter under date of June 8, 1908, in which

attention is directed to the British Patent to Harmatta 22,981 of 1903. How much sooner than that date, to wit, June 8, 1908, if any, had your attention been directed to Harmatta, his British Patent or any spot welding work done by him?

A. I can not say whether I knew anything of Harmatta's application previous to that time, or even at that time, as sometimes I did not see the communications which Townsend & Decker had with the Thomson Electric Welding Company in the case. Oftentimes I was absent from the factory two or three weeks at a time and did not always see all correspondence which may have come to the office of the Thomson Electric Welding Company during my absence. While I believe I probably learned, or saw this communication approximately at or near the time that it was forwarded to the Thomson Company by Townsend & Decker.

Q. 59. Did, or did not, you know of Harmatta and his spot welding work through any source prior to the time when his patent was referred to by the Patent Office in your application?

A. Absolutely not.

Q. 60. You subsequently in the prosecution of your application made affidavits swearing back of the date of the Harmatta invention, did you not?

A. I know that I filed application but I did not think or even know that I was swearing back of Harmatta or any other application, I was simply requested by my attorneys that an affidavit was necessary in the prosecution of the case. They asked me to give them such information as I had and what I had done and approximate dates at which I did the various experiments. This information was given them and the affidavits prepared and executed by me.

Q. 61. I hold in my hand a certified copy of the file wrapper and contents in the matter of your application of the patent No. 928701, and I find therein an affidavit executed by you on the 23d day of October, 1908, reading as follows:

County of New York }
State of New York } ss

ADOLPH F. RIETZEL being duly sworn deposes and says that he is the applicant who filed the above entitled application for patent; that some time in June 1904 he successfully practised the invention in said application by uniting two halves of a sheet metal pulley in an electric welding machine at the shop of the Thomson Electric Welding Co., in Lynn, Mass.; that the piece of sheet metal herewith attached and marked: "specimen of pulley C. F. Tischner Jr. N.P." is a duplicate of one of the halves of the pulley to which he at that time applied the invention; that the contact points or projections formed in the sheet metal were in the first instance made by filing the metal to leave the contact points or projections, indenting not being available at that time, but that in subsequent operations

in which his invention was employed the projections were made by indenting the sheet metal, and that the invention was frequently practised by him successfully at the shop of said Company on a standard welding machine; that in conducting the operations on such machines he employed a pair of contacts fitted in the jaws of the machine and formed at their outer ends so as to fit into the cup shaped portion of the halves of the sheet metal pulley to be welded, thereby supporting the two halves with the contact projections engaged with one another; the two halves being in contact by the projections while assembled in the machine, electric current was caused to pass through the two halves by the contact projections, and pressure was then applied in the usual way practised in electric welding by the standard machine in which the operation in question was conducted; the operations above recited as conducted by him were uniformly successful and demonstrated clearly that the invention was complete in all particulars, and that the said invention has been since practised on innumerable occasions in substantially the same way for uniting pieces of sheet metal such as the halves of sheet metal pulleys of the form shown in the exhibit and of other forms and of other sizes, many of much larger size than that of the exhibit; that he does not know and does not believe that the invention aforesaid has been in public use or on sale in this country, patented or described in a printed publication in this or any foreign country for more than two years prior to his application and that he has never abandoned the invention.

ADOLPH F. RIETZEL

Subscribed and sworn to by the aforesaid Adolph F. Rietzel before me this 23d day of October 1908.

C. G. TISCHNER, JR.,
Notary Public.

(Seal)

NOTARY PUBLIC, KINGS COUNTY,
CERTIFICATE FILED IN NEW YORK COUNTY

Do you recall this specimen of sheet metal referred to in that affidavit as specimen C. F. Tischner, Jr. N.P.?

A. I do.

Q. 62. Please describe how the pulley referred to in the affidavit was made?

A. Why, it was made of sheet steel of about 1/16 inch thick, and was formed up in such a shape that when two of the pieces were united it formed a grooved pulley.

Q. 63. In the affidavit you say that the contact points or projections formed in the sheet metal were in the first instance made by filing the metal to leave the contact points or projections. Were these projections thus produced formed upon both of the cooperating halves of the pulley?

A. They were.

Q. 64. Did the projections upon the respective halves contact with one another and did the welding take place between such contacting projections?

A. They did, and the welding took place at those projections only.

Q. 65. Do you know what has become of the specimen referred to in, and which accompanied that affidavit?

A. I do not. The last I saw it was when I turned it over to Townsend & Decker.

Q. 66. Have you in your possession, or has there been preserved anywhere to your knowledge, any of the pulleys welded together in accordance with the plan set forth in the affidavit?

A. There may still be some in existence but I don't know where they are. There was quite a number of them welded.

Q. 67. Where were they welded?

A. At the factory of the Thomson Electric Welding Company, Lynn, Massachusetts.

Q. 68. Was this work done in your own behalf or in behalf of the Thomson Electric Welding Company?

A. It was done on behalf of the Thomson Electric Welding Company but I did the work even to preparing the first sample and welded them the same day that the samples were presented to us and at the same time I gave instructions to the party who submitted these samples as to how to prepare the next lot which he was to send us.

Q. 69. Briefly what were these instructions?

A. The instructions were to have the next lot of stampings prepared with small projections at a number of points around the circumference. These instructions were given verbally and a sketch was made on the visiting card of the party who brought the work to us.

Adjourned to the office of Messrs. Fish, Richardson & Neave, 84 State street, Boston, Mass., at 10:00 a.m. Tuesday, January 7, 1919, by agreement of counsel.

At the Office of
Fish, Richardson & Neave,
84 State Street, Boston, Mass.
January 7, 1919, 10 A.M.

Met pursuant to adjournment.

Present: Counsel as before.

(Direct examination of Mr. Rietzel continued.)

Q. 70. Who was the party to whom you gave the instructions?

A. I think his name was Knipe.

Q. 71. If he was connected with any concern?

A. I think it was the Knipe Mfg. Company but do not know how extensive a company it was.

Q. 72. Did you or the Thompson Electric Welding Company furnish them with machines for welding these pullies?

A. We did not.

Q. 73. Did anyone to your knowledge do so?

A. Not to my knowledge.

Q. 74. In this affidavit executed by you on the 23rd of October, 1908, you refer to your work on pullies in 1904, why did you not refer to your earlier work of 1897-8?

A. I don't know why I did not.

Q. 75. Was it a failure to do so by advice of counsel.

A. I think not.

Q. 76. Did you or your counsel prepare the affidavit?

A. The counsel prepared it but I outlined the facts.

Q. 77. In the file wrapper of your application for your patent 928721 I find another affidavit filed March 13, 1909, and verified on the 18th day of February, 1909, which reads as follows:

AFFIDAVIT

County of New York }
State of New York } ss:

ADOLPH F. RIETZEL, being duly sworn, deposes and says, that he is the applicant that filed the above entitled application for patent;

That prior to the 18th day of February, 1904, he repeatedly, successfully practised the method of fastening two sheets of metal together face to face by welding them at spots in their meeting surfaces by confining the heating electric current passed from one plate to the other in such spots and localizing the welding pressure at said spots, as claimed broadly in said application;

That the work of so uniting such sheets of metal was done at the factory of the Thomson Electric Welding Company at Lynn, Massachusetts, on a Welding Machine of a commercial type known as type 10 A Welder;

That said Machine was the same in construction as the machine known as type 5 A Welder but of larger size and was identical with that shown on the attached page removed from a catalogue of the Thomson Electric Welding Company, which page is identified and marked "Page of Catalogue, D. M. Edsall, N. P.";

That the accompanying pieces of work marked "Specimen No. 1, D. M. Edsall, N. P." and "Specimen No. 2, D. M. Edsall, N. P." are duplicates of work so done by him on that ma-

chine prior to the 18th day of February, 1904, but that the original specimens were not preserved;

That in doing such work he employed a pointed electrode, the same in form as the accompanying electrode marked for identification "Welding Electrode, D. M. Edsall, N. P.", which Electrode was clamped in one of the holders of the machine and was used to apply the localized pressure and heating current to the plates which were welded together at spots in their superficial area, the opposite or backing electrode being a block of metal which was flat and of a superficial area, approximating the area of the plates which were welded together and which opposite electrode was clamped in the opposite holder of the machine;

That in this operation the two plates superposed upon one another were inserted between said electrodes and the pressure and heating current localized as claimed were applied by forcing the pointed electrode against the outside face of the plates and pressing them between said pointed electrode and the opposite flat electrode, current being at the same time passed from one electrode to the other and pressure being applied by employing the usual devices forming a part of the machine and used in the ordinary operation of the machine for applying welding pressure to the work;

That work was repeatedly and successfully done in this manner upon various sizes and pieces of metal plates, none of which however, are now existence so far as affiant has been able to discover;

That the work done by him as aforesaid, demonstrated the complete success of the operation and that metal plates could be successfully and firmly united together by distinct or isolated electric welds forming welded spots of union in their meeting faces and constituting in effect a successful substitute for a union of the same by a number of rivets.

ADOLPH F. RIETZEL

Subscribed and sworn to before me this 18th day of February, 1909.

DAVID M. EDSALL
Notary Public
N. Y. Co.

What was that you refer to that you repeatedly successfully practiced prior to the 18th day of February, 1904, as referred to in the second paragraph of this affidavit?

A. I referred to the work which I did in July, 1898, and which I have referred to previously in this testimony, also to some work which I did in September or October of 1898.

Q. 78. Please describe what you did in Sept. or Oct. of 1898.

A. I attempted to weld some plough share blades which were

brought to us to be welded together, these blades were of an uneven thickness but the average thickness was about three thirty-seconds of an inch. These blades were placed on top of one another and I tried to weld them in the same manner using the same kind of contacts that is, one had quite large flat surface while the other was pointed at one end. I was not, however, able to make successful welds on these specimens and I abandoned its use on that particular work. A few days after I continued my experiments with various pieces of steel varying in thickness from one-sixteenth to one-eighth of an inch, and it is this work and that I did in July of the same year that I refer to, in this affidavit.

Q. 79. Was this work you speak of doing after the plough share blades successful, and was it the welding of spots of comparatively small areas between plane proximate faces of the article?

A. I considered the experiment fairly successful and the area welded were comparatively small and isolated, these pieces were simply experimental no attempt being made in placing the pieces one upon the other to have any definite lapping over, it was simply trying the results of this method of welding on various kinds of steel.

Q. 80. Where was this work done?

A. At the factory of the Thompson Electric Welding Co., Lynn, Massachusetts.

Q. 81. What became of the electrodes that were used in this work last referred to by you?

A. I do not know.

Q. 82. Were any specimens of that work preserved?

A. I don't think so.

Q. 83. Were the plough share blade samples returned to whoever handed them over to you for welding?

A. They were, except a section or a piece of the welded plough share, but these shares were welded by punching up points or projections and were not welded with a pointed electrode, but special electrodes were made to weld the share and the area of contact was considerable as compared with what is termed a pointed electrode.

Q. 84. These welded plough shares or blades were the ones that were returned?

A. They are.

Q. 85. Who was the party to whom you furnished the plough share or blades or to whom they were returned?

A. I believe his name was LaDow.

Q. 86. Was this one of the LaDows who manufactured agricultural implements at Dayton, Ohio?

A. I don't know.

Q. 87. Would any of the company records show whether or not such was the fact?

A. I don't know.

Q. 88. Was the type of welder employed in these operations referred to in this affidavit, that shown on the page of catalog ac-

companying the affidavit and marked "Page of catalog D. M. Edsall, N.P."

A. It was exactly the same type, same construction, but was of double the kilowatt capacity and was termed type 10 A.

Q. 89. The affidavit refers to accompanying piece of work marked "Specimen No. 1 D. M. Edsall, N.P." and specimen No. 2 D. M. Edsall, N." as duplicates of work done by you on that machine prior to the 18th day of February, 1904, what if you know has become of these specimens?

A. I do not know what has become of them, the last time I saw them was in the office of Townsend & Decker at or about the time this affidavit was filed.

Q. 90. Who prepared them?

A. I had the contacts or electrodes and the specimens prepared under my instructions at the factory of the Thomson Electric Welding Company, but I personally welded these specimens.

Q. 91. At about what date was this?

A. It must have been a few days or weeks prior to filing the affidavit in question.

Q. 92. Do you know where the electrodes referred to in the affidavit are?

A. I do not.

Q. 93. Have you the counterparts of those specimens or of those electrodes in your possession, or do any such exist of which you have knowledge, and if so where are they?

A. I have not got them in my possession, neither do I know who has them or where they are.

Q. 94. Was the work which you have above referred to in connection with plough shares or blades with punched up projections the first welding work you had done in which projections were used to localize and restrict the area of the welding points instead of a pointed electrode?

A. I think it was.

Q. 95. The spot welding by the use of a pointed electrode for localizing the area of the weld between plane proximate sheets then preceeded the use of projections between the proximate faces of the sheets in your development of the invention?

A. Apparently so.

Q. 96. Please state what your definite recollection on that is?

A. My testimony shows it.

Q. 97. Which gave the stronger weld, the welding of plane plates or the welding of plates provided with projections?

A. Theoretically two specimens using equal conditions that is to say the welded areas on each specimen being exactly the same, I should say there was no difference, one would be of the same strength as the other, but in practice and doing commercial work, more uniform and therefore better and stronger work would be obtained by using the projection method.

Q. 98. Does this accord with your actual experience, as determined by your earlier work about which we were talking?

A. It does.

Q. 99. Referring to the two affidavits filed with your application, who prepared them and where were they prepared?

A. They were prepared by instructions and the data given by me to Townsend and Decker. Where they were prepared I can not state positively whether they were prepared at their office in New York or at the office of the Thomson Electric Welding Co. but I think they were prepared at Townsend & Decker's office.

Q. 100. Was the data and the questions in the form of written or verbal communication?

A. Given verbally.

Q. 101. And to which member of the firm of Townsend & Decker received them?

A. To Charles F. Tischner, Jr.

Q. 102. I notice that these affidavits were executed by you in New York. Did you go to New York for the purpose of giving the data and instructions and at that time executing the affidavit?

A. I probably did.

Q. 103. What is your best recollection of this?

A. I did as near as I can remember.

Q. 104. Are you the patentee of patent No. 1,041,351 dated Oct. 15, 1912, application filed Dec. 26, 1906, construction of sheet metal utensils.

A. I am.

Q. 105. Did you ever practice the invention of that patent and if so to what extent and when?

A. Did not practice it at all, but that patent was applied for on the ideas and from my observation that such work could be successfully done. I might modify the first part of the answer, I did experimental welding by welding together as described in the patent just pieces of scrap metal just to satisfy myself that the invention carried out was practical.

Q. 106. When did this idea first occur to you?

A. I can not recall the exact time now but it must have been shortly before the application was filed or about the time the application was filed.

Q. 107. There are no projections on the proximate faces to be united disclosed in this patent, are there?

A. I don't think so.

Q. 108. Is one of the electrodes (5) of this patent reduced in area at the contact end or not?

A. It is only reduced in area insofar as it had to be made to conform to the work which was to be welded, and not for the purpose of reducing the contact area for localizing the heat, as for instance, if 3 had been a flat piece instead of an irregular shape a flat contact of considerable area would answer the purpose intended.

Q. 109. Do you know of any commercial use whatever of this

invention of this patent or of utensils welded in accordance with the disclosure of the patent or of machines designed for such welding?

A. Not that I know of.

Q. 110. Do you know of any commercial use of spot welding for attaching bail ears or handles to utensils or receptacles and if so please state what it is?

A. I do not quite understand what you mean by spot welding, whether the articles to be welded have been prepared with projections or whether they have not been prepared and welded by what is termed the electrode weld. If the latter case is meant I know that a great many machines are in use for this class of work, but can not say that I have seen any in operation, nor can I state positively in what factories they are being used, if you refer to such articles welded by what is known as point welding, that is, preparing the work to be acted upon with points or projections I can say that there was a concern that was doing this work and I personally saw the machines in operation.

Q. 111. About when was it and where was it that you saw these machines?

A. At the factory of the New England Enameling Company, Middletown, Connecticut. I can't give the exact time but my recollection is the latter part of the year 1906 or early 1907.

Q. 112. Did the Thomson Electric Welding Company furnish the machines?

A. The Thomson Electric Welding Company leased the machines to the Universal Electric Welding Company who in turn subleased them to the Enameling Company, above referred to.

Q. 113. What was the Universal Electric Welding Co. and when was it organized?

A. As I remember the Universal Electric Welding Co. was originally the Standard Pulley Company of New York, when they changed their name I do not remember. Their business I believe was the manufacture of sheet steel pullies of all kinds and later they went into electric welding under a lease from the Thomson Electric Welding Company.

Q. 114. When if you know did they begin to manufacture sheet steel pullies?

A. I don't know when.

Q. 115. When did you first have any knowledge of their manufacture of sheet steel pullies?

A. In the year 1904.

Q. 116. What were they doing then and how did you obtain knowledge of it?

A. I don't know exactly what they were doing except they were making some small steel sheaves or pullies, and I first heard of them through their President, Maurice Lachman. I think it was August 1904.

Q. 117. What did he do or say at that time which acquainted you with other things they were doing or wanted to do.

A. He brought with him at the time of his visit to the factory of the Thomson Electric Welding Company six or eight parts of pullies which he wished to have welded together if possible.

Q. 118. What if anything did you do or tell him you could in connection with the welding of such pullies?

A. The parts of pullies which he brought with him were not prepared properly so that they could be successfully electric welded. I then explained as to how they could be welded by forming projections on the surfaces which were to be joined. This I did with an ordinary prick punch and hammer and I welded, in his presence the parts of pullies which he brought up. These results pleased him very much and he subsequently came again about ten days later with more parts of pullies prepared as per the instructions I gave him in his previous visit. These parts were welded together and the results were highly satisfactory.

Q. 119. I show you now a copy of a patent to L. S. Lachman, No. 904,540. dated Nov. 24, 1908, and ask you if the sheet metal pulley shown therein and particularly as shown in figures 1, 2 and 3 is substantially the pulley referred to by you as above given in your testimony?

A. It is not exactly the same but practically the same as far as the projections are concerned, but not as to the design of the pulley.

Q. 120. Among the title papers offered in evidence by the plaintiff in this case there is an agreement dated June 17, 1909 between Thomson Electric Welding Company and Universal Electric Welding Company in which reference is made to an interference between "the application of Adolph F. Rietzel serial No. 247,081 (which is the application resulting in your patent of July 20, 1909) and the application of Maurice S. Lachman, serial No. 133,109 owned by the Universal Electric Welding Co." Do you recall the fact of that interference between your application and the application of Lachman referred to?

A. As I remember there was such an interference but I did not know until now that an agreement had been reached between the Thomson Electric Welding Co. and the Universal Electric Welding Company.

Q. 121. How was that interference terminated or do you recall anything in connection with it?

A. That I do not know.

Q. 122. Do you recall ever seeing the Lachman application in the interference or a copy of the same or that anyone explained to you what was embodied therein?

A. I did not see a copy of the Lachman application but I learned that there was an interference declared with my application serial No. 247,081, and as I remember the matter was adjusted but how and on what terms I did not know.

Q. 123. When Mr. Lachman the president of the Standard Pulley Manufacturing Company brought the pieces of pullies to you

did you or did you not suggest to him that they might be welded together in spots with the use of a pointed electrode or contact rather than with the use of punched up projections in the metal of the pulley?

A. I did not suggest the use of such an electrode.

Q. 124. Why not?

A. Well one reason might be that I didn't think of it, then I didn't think it was practical to use such an electrode and that by the use of projections the pullies could be more readily welded as the conditions for successful electric welding were better by the use of projections on these particular pullies than any other method I could think of at that time.

Q. 125. In addition to the patent to L. S. Lachman No. 904,540 Nov. 24, 1908 filed March 24, 1905 I call your attention to patent to L. S. Lachman No. 828,033 dated August 7, 1906 filed July 28, 1905 and in which at the end of the specification there is reference to a copending application filed by Lachman Nov. 17, 1904 serial 333,109. The latter application is the one I understand which was in the interference referred to by you. When were you first informed of Lachman's claim of inventorship of the subject-matter of the patent in application. In this connection I will call your attention to claim 1 of patent 904,430 and to the further fact that Lachman in a British patent No. 23,077 of 1905 made the following claim.

> "The process of fastening sheet metal plates together face to face over their plane surfaces by a multiplicity of distinct electric welds or unions made by providing over the surfaces a multiplicity of contact spots and then applying pressure to the plates while included in an electric circuit."

A. All that I can say is that I probably was informed of the interference at the time or shortly after it was declared by the patent office. As I remember I did know that Lawrence S. Lachman did make an application for a patent to be granted him on the makof the details or any of the dates at which the application or applications were filed. In reference to the interference I might state that it was probably called to my attention through Thomson's attorneys, Townsend and Decker and that I subsequently gave them a history of the subject matter in question, at or about the time the interference was declared.

Q. 126. Please state as near as you can the date when you first learned of Lachman's claim of inventorship?

A. I think it was the latter part of 1907.

Q. 127. What was the relationship between Mr. Maurice Lachman and Mr. Lawrence S. Lachman, either blood relationship or business relationship?

A. The blood relationship, as far as I know, Maurice Lachman was the father of Lawrence S. Lachman, business relationship was friendly, or cooperative. Maurice Lachman was president, I be-

lieve Lawrence Lachman was secretary, of the Standard Pulley Company.

Q. 128. Prior to the time when Mr. Maurice Lachman brought you the pulley parts and you welded them together in spots and disregarding the work you did in 1897-8 please state briefly what similar work you did between those two periods?

A. I welded a number of pullies on which projections were formed in the early part of June, 1904 and about a month later welded another lot I should say two hundred or more, these pullies were of the same shape and size as the specimen pulley referred to in my affidavit executed by me on the 23rd day of October 1908 with the exception that the two hundred or more pullies which I welded had projections formed on them. I don't remember or can not recall of doing any other work between those dates mentioned, in your question.

Recess.

Q. 129. Was there any machine made to your knowledge for welding the pulley parts together such as those made by the Standard Pulley Manufacturing Company?

A. There was.

Q. 130. When and by whom?

A. I think it was built in the years 1905 and 1906 and built by the Thomson Electric Welding Co.

Q. 131. Please state if you know to whom it was sold or leased and whether or not it went into commercial use?

A. It was leased to the Standard Pulley Mfg. Company and they subsequently sub-leased it to the American Pulley Company of Philadelphia, Pa. and was put in commercial use by them.

Q. 132. Do you know whether the Standard Pulley Mfg. Co. used it for manufacturing welded pullies?

A. I don't think they used it for welding any of the pullies that they were making at that time, so far as I know.

Q. 133. Did they make any use of it as far as you know and if so what was that use?

A. The only use I know that they put this particular machine was for welding samples and various lots of pullies before shipping it to the American Pulley Company, my recollection is that when the Standard Pulley Mfg. Company ordered this welder from the Thomson Company they stated that it was to be leased to the American Pulley Company but instructed us to ship the machines to their plant in New York City where they would test it out before shipping it to the American Pulley Company.

Q. 134. When did you first learn that Harmatta had obtained his patent 1,046,066?

A. Just now, today.

Q. 135. Did you not know before this that in the Rietzel-Harmatta interference which was declared between your patent No. 928,701 and the Harmatta application serial No. 183,677 had re-

sulted in a judgment of priority in favor of Harmatta and that his patent with the claims in issue of that interference had been issued?

A. I did not.

Q. 136. And did no one notify you in respect to the final outcome and result of that interference?

A. No, sir.

Q. 137. In welding two plates one of which is flat in plane and the other of which is provided with a projection according to the disclosure of method of your patent 928,701 is there or is there not a localization of the pressure and current at the point of welding?

A. There is.

Q. 138. In welding these plates, both of which are flat in plane by the application of two pointed electrodes or by application of a flat electrode on one side and a pointed electrode on the other side is there or is there not in like manner a localization of pressure and current at the point of weld?

A. There is.

Q. 139. In both instances then is not the effective welding heat generated principally at the point of contact and pressure between the plates?

A. It is.

Q. 140. Do you know Prof. Thomson and if so how long have you known him?

A. I do know him and first got acquainted with him or came in personal contact with him in the fall of 1888.

Q. 141. Did you ever discuss with him the spot welding of plates provided with projections, and if so when did you first discuss it with him?

A. I did discuss it with him and I should say it was shortly after the second visit of Maurice Lachman to the factory of the Thomson Electric Welding Company which I think was about October 1904.

Q. 142. Did you ever discuss with him the subject of spot welding plane plates unprovided with projections, and if so when did you first discuss the matter?

A. On one occasion only, the exact time I cannot tell you, but it was five or six years after I left the employ of the Thomson Electric Welding Company.

Q. 143. Did you ever file any application for patent for improvement in electric welding process or apparatus that did not result in a patent or patents?

A. I think not, all applications I made in the Patent Office have been allowed except those which have been lately filed and which are still pending.

Q. 144. Please tell us how it was that you came to first practice the process of welding plane plates together by means of a flat electrode on one side and a pointed electrode on the other side?

A. This matter was brought to my mind when I made a trip throughout the West visiting the plants of the various licensees of

the Thomson Electric Welding Company, this trip being my initial one and being made for the purpose of learning what troubles the various licensees were having if any with a view in mind to correcting these troubles in future welding machines which the Thomson proposed building. The trip was also made with a view to assisting the various licensees with their products they were producing with their welding machines. In one particular instance one of the users of the Thomson Welding machine complained somewhat as to the expense of removing the burr or finn which is produced when making a butt weld. The particular work that these people were welding and which they complained of the most was the welding of hub bands, and which they made a great many of. The method of welding these bands was to abutt the ends of the bands heating that section which projected from the contacts of the welding machines and when the metal between these contacts was at a plastic state pressure was applied and the weld completed. In applying this pressure surplus metal is squeezed up at the point of union and as this surplus metal or burr or finn was objectionable and the articles could not be used with this finn on them it was necessary to remove it either by grinding or chiseling or machining it off after the welds were made, or while still hot put under a press or a hammer and the finn or burr reduced in that manner. The first method that of chiseling or machinery was expensive, the second that by pressing or hammering was dangerous as it greatly weakened the joint. It was then or shortly after that trip I began to think what could be done as to the welding of the hub bands not only for this particular concern but for the general business I concluded to try lap welding. I wish to have it understood here, at that time to my knowledge nothing was known of spots, points, or projection welds. All that was known at that time was butt welding. I then conceived the idea of taking these bands overlapping their edges about one-quarter or two three-eights of an inch placing the ends so lapped between two copper electrodes or contacts of approximately the same surface area or width as the work itself, then passing a welding current through them and when the metal was at a plastic state apply the pressure and complete the union. I found that this method was not practical for the reasons that it took a great amount of current and would prohibit its commercial use for at that time electric current was not available in such quantities or at such low prices as they are now and many instances they did hardly have enough steam power to operate these welding machines. It then occurred to me that I might possibly be able to accomplish the desired result by making a series of local welds across the plane faces of the overlapped edges of the band. This I carried out as explained previously in this testimony. The results however, were not sufficiently good for the purpose of welding these bands, in the first place the area welded was a great deal less than the area welded when the bands were butt welded and consequently they were not strong enough to stand the strain put upon them when put to their proper use, furthermore the object of this idea was to elim-

inate or reduce as far as possible the burr or finn thrown up in butt welding, but the specimens welded locally had the same objection that when the band was completed the joint was still overlapped and sufficiently high as to preclude its use for commercial purposes. I consequently gave up experimenting along that line as I did not consider it a success with that particular job and while I made or welded several pieces of sheet metal of various thicknesses together at the same time that I was making these experiments I did not go into it further as I did not see at that time where I could apply that style of welding on any of the work which we had in hand at that time, until as I stated in my previous testimony in September and October of that same year 1898 I attempted to weld some samples or a sample of plough share blades which was submitted to us by Mr. LaDow but which experiment did not prove satisfactory. As far as I can remember there had not been presented to us any work to which this style or method or welding might have been applied or if there had been I did not see it at the time.

Q. 145. What is your recollection with respect to the size, thickness and material of the plough share blades submitted by Mr. LaDow?

A. On Mr. LaDow's first visit he only brought with him a piece of a plough share which had been previously braised together as near as I can recollect there were two plates, one on top of the other the length of which were about eight inches, the width about two inches the thickness varying possibly from an eighth of an inch to a sixteenth of an inch, the plates were bent on a slight curve and I believe were made of a high carbon steel. The other two samples which Mr. LaDow brought with him at a later date I did not see, but I understood they were full size plough share blades. These blades were welded at the factory of the Thomson Electric Welding Company during my absence from the factory, but were made as per my instructions which I left before leaving on the trip I was going to make, knowing or expecting that Mr. LaDow would call with his samples before I returned which was the case.

(By Mr. Stackpole: So much of the answer as relates to what the witness did not see is objected to as hearsay.)

Q. 146. Please tell us what your instructions were with respect to the welding of these plough shares?

A. To weld them the same as I have welded the first sample that Mr. LaDow brought with him by punching up points on the samples and then welding them.

Q. 147. To whom were these instructions given?

A. To Mr. Robert Clark.

Q. 148. Then I take it that he was familiar with the work you had already done along this line?

A. Well he was inasmuch as I showed him the sample which I had previously welded for Mr. LaDow, I might add that Mr. Clark

did all the job welding which came into the Thomson Company and had charge or was foreman in that department and he also did considerable sample and experimental welding under my instructions.

Q. 149. I take it that you were absent from the works for comparatively long intervals between the time referred to in your answer to question 145 (when you were absent from the factory) up until 1905 to 1907. As Mr. Clark was familiar with this kind of work is it not entirely probable that he would do other samples according to this spot welding method during your absences?

(By Mr. Stackpole: Objected to by Mr. Stackpole as calling for hearsay evidence and for a mere opinion.)

A. Can say that from 1897 until the time I left the employ of the Thomson Electric Welding Company I have been absent from the factory a great many times varying from two days to possibly three weeks at a time, usually just before I went off on these trips I left certain instructions to the various foremans of the different departments as to about what they should do and often times I left instructions to Mr. Clark to weld certain samples that may come in during my absence, but unless he was told specifically to weld them he did not weld any samples which may have come in during my absence and on which he did not have any instructions. Up to 1905 Mr. Clark or anybody else knew little or nothing as to projection or the so-called electric welding. Of course, I can not state that he did not do anything in this line if he did or any one else they never told me of it.

Redirect examination closed.

Cross-examination by MR. STACKPOLE.

X-Q. 150. Did you make the samples by the method illustrated in defendants exhibit Rietzel sketch at your own initiative or at the instructions or someone else?

A. I made them of my own initiative.

X-Q. 151. Did you inform the officials of the Thomson Company of this work?

A. I did not.

X-Q. 152. Did you show any samples of this work to the officials of the Thomson Company?

A. I did not.

X-Q. 153. So far as you know what knowledge did the officials of the Thomson Company have of this work at that time?

A. Not any to my knowledge.

X-Q. 154. Am I correct in understanding that the result of the work, that is the welded hub bands were unsuitable for use as hub bands?

A. They were not suitable for the purpose intended.

X-Q. 155. As shown in defendants exhibit Rietzel sketch the welds are made at the edges of the overlapped portions. Do you remember whether at the welds the metal of the upper piece was squashed down or not?

A. It was to some extent.

X-Q. 156. Do you remember whether there was metal squeezed out between the pieces at or near the welds?

A. Yes there were, the upper piece or the piece on which the pointed electrode operated showed the most metal disturbed or heated. The electrode itself penetrating the upper plate comparatively deep.

X-Q. 157. As I understand it you thought of using this pointed electrode to make several welds in place of a single electrode to make one continuous weld as a means for saving current over that first method? Is that so?

A. That is exactly right.

X-Q. 158. Was it part of your object in making your experiments with the overlapped ends of the hub bands to squash down the ends so that they should lie in the same plane?

A. The object was that and also as stated in the previous question to save current. In order that the bands could be commercially used it was necessary that the overlapping edges of the band should be in approximately the same plane when finished.

X-Q. 159. Inasmuch as the bands thus welded by you were useless for their intended purpose was there any reason for keeping them?

A. There was not, they went in the scrap pile almost immediately.

X-Q. 160. After you had done this work in July, 1898, when did you next attempt to weld plane sheets between two electrodes one of which was pointed except for the unsuccessful attempt to weld plough share blades in the fall of that year to which you have referred?

A. I think I experimented a little further either the same day that I experimented on the plough share blades or the next day or possibly the second day after, I know it was immediately after I tried to weld the plough share blades. The pieces that I experimented on were pieces of scrap stock picked up in the factory and welded together without any attempt at any particular form or shape.

X-Q. 161. After 1898 did you abandon this process of welding until 1905 or thereafter?

Objected to as calling for a legal conclusion.

A. Can state that I don't recollect of doing anything more in that line though still having the matter in mind. At that time I was an extremely busy man and did not get much time for experimental purposes. The business of the company expanded rapidly so much so that just at that period we contracted out as much as 40% of the capacity of our factory. The nearest approach of doing anything

near to that was the welding of those furrules to which I referred to in my previous testimony in the year 1906.

X-Q. 162. After the year 1898 when did you first have occasion to make practical use of the projection method of welding?

A. In June, 1904, when I welded some small pullies brought in by a Mr. Knipe.

Cross-examination closed.

Redirect-examination by MR. STUART.

Re-D. Q. 163. In your answer to X-Q. 152 and 153 you state that you did not inform the officials of the Thomson Company of your spot welding work nor did you show them any samples of this work. Do you mean at any time up to this date?

A. No, I called to the attention of the officials of the company of various ideas which I may have thought up or experimented with, but only as near as I can now remember during the last two or three years in my connection with them, the reason for this is that I practically managed and run the factory and did nearly all the business with the exception of signing leases or special contracts and that the officials of the company usually left those matters to my judgment. The officials with whom I had to deal with mostly were the president of the company, Mr. B. F. Spinney, and Mr. Wm. H. Hodges who was secretary and treasurer of the company. Neither of these gentlemen were practical men or knew much about mechanics or even electric welding. I consulted with Elihu Thomson, who was consulting engineer of the Thomson Electric Welding Company at various times but as a rule I never consulted with any of the officials of the company on any new or experimental work both as to the method of welding or designing electric welding machines until such time that I had in my own mind decided that the particular experiment or machine was a practical or commercial success.

Re-D. Q. 164. How do you reconcile your answers to X-Q's 160 and 161 with the statements in your affidavit filed in your application for patents and executed on the 15th day of February, 1909, in which you say "That prior to the 18th day of February, 1904, he repeat-"edly, successfully practiced the methods of fastening two sheets "of metal together face to face by welding them at spots in their "meeting surfaces by confining the heating electric current passed "from one place to the other in such spots and localizing the weld-"ing pressure at such spots,.....
"that work was repeatedly and successfully done in this manner "upon various sizes and pieces of metal plates,.....

"That the work done by him as aforesaid, demonstrated the com-"plete success of the operation and that metal plates could be suc-"cessfully and firmly united together by distinct or isolated electric "welds forming welded spots of union in their meeting faces and

"constituting in effect a successful substitute for a union of the "same by a number of rivets."

A. I can answer that by saying that I did weld various pieces of sheet metal together by using the pointed electrodes as one and a flat electrode as the other but only so far as I can remember now at the times mentioned that is in July, 1898, and again in September or October, 1898, I considered some of the welds that I made satisfactory and successful but did not consider it a commercial or practical experiment at that time.

Re-D. Q. 165. Why do you now call it an experiment and in 1909 when you executed your affidavit you called it a successful demonstration or reduction to practice of the invention?

(By Mr. Stackpole: The question is objected to as misstating what the witness said in his affidavit insofar as the work therein referred to is called a reduction to practice.)

A. I will state that possibly in fact can say that I didn't know and don't know what reduction to practice really means and this affidavit referred to was prepared by my attorney Townsend & Decker from the instructions or data which I gave them and which is substantially the same as I have testified here and I executed those papers thinking that it was correct.

Re-D. Q. 166. In executing those papers you executed them for the benefit of the Thomson Electric Welding Co. did you not?

A. I did.

Re-D. Q. 167. How are you now related to Thomson Electric Welding Company, or the Thomson Spot Welder Co. or those affiliated with them?

A. The only relation that there is that I occasionally assist them in their engineering department from time to time for which they pay me a certain sum per day plus traveling expenses.

Re-D. Q. 168. You appeared as witness in this case in response to a subpoena issued by the District Court at Providence on the 3rd day of January 1919, did you not?

A. I did.

Recross-examination by MR. STACKPOLE.

Re-X. Q. 169. In July 1898 you carried out the method illustrated in defendants exhibit Rietzel sketch and according to your affidavit of February 18, 1909 the circumstances must have been told by you to Townsend & Decker. Between 1898 and 1909 what occasion did you have to tell anyone of your work illustrated by this Rietzel sketch?

A. I didn't have any occasion to tell anyone.

Re-X. Q. 170. Did you do so?

A. I did not.

Redirect-Examination by MR. STEUART.

Re-D. Q. 171. Did you tell no one about this 1898 work not even your attorneys at the time your application was prepared nor at the time of the interference with Lachman, nor at the time when you prepared and executed your affidavit of Oct. 23rd, 1908?

A. The only communication was at the time that I did the work in 1898 when I stated that I was quite sure I showed this work to Mr. Clark and Mr. Osgood at or about the time I did it. It might again been brought to the attention of both of the aforesaid gentlemen at the time I welded the LaDow samples. The next communication was to Townsend & Decker and it is possible that I may have communicated to them this information at the time the first affidavit was prepared at any rate I can say that it was not communicated to anybody except to my attorneys Townsend & Decker. I don't remember of having communicated to Townsend & Decker this information at the time the Lachman interference was declared as I don't even recollect just when the Lachman interference was declared or when I learned of it, but it may have been possible that it was communicated to Townsend & Decker at that time. I have no means now of verifying the exact date except by recollection. It must be borne in mind that I had several patents pending in the office and citations and interferences and affidavits and preliminary statements were filed by me that I can not now pick out which ones or definite dates and information as to the various applications given to my attorneys.

Deposition closed signature and certificate waived by consent of counsel.

UNITED STATES DISTRICT COURT.

EASTERN DISTRICT OF MICHIGAN,

SOUTHERN DIVISION

In Equity.

ON HARMATTA PATENT NO. 1,046,066.

THOMSON SPOT WELDER COMPANY, PLAINTIFF,

vs.

FORD MOTOR COMPANY, DEFENDANT.

STIPULATION.

It is hereby stipulated and agreed by and between counsel for the respective parties hereto that the originals of depositions taken herewith as well as the Exhibits offered in connection therewith,

may be delivered to and remain in the custody of the counsel for the party taking and offering the same until the trial or hearing of the cause, subject to inspection and all proper use by opposing counsel upon reasonable notice.

MELVILLE CHURCH,
Counsel for Defendant.
J. L. STACKPOLE,
Counsel for Plaintiff.

UNITED STATES DISTRICT COURT,

EASTERN DISTRICT OF MICHIGAN,

SOUTHERN DIVISION.

IN EQUITY.

THOMSON SPOT WELDER COMPANY. Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

ON HARMATTA PATENT NO. 1,046,066.

STIPULATION.

It is hereby stipulated and agreed by and between counsel for the respective parties hereto that the annexed copy of the depositions of the following named witnesses, together with the exhibits offered in connection therewith, heretofore taken and introduced in the several suits pending in the District Court of the United States for the District of Massachusetts entitled respectively, American Electric Welding Company and Thomson Spot Welder Company vs. Houghton & Dutton Company, Equity No. 794, SAME vs. George Borgfeldt & Company, Equity No. 795, SAME vs. S. S. Kresge Company, Equity No. 796, SAME vs. Grand Union Tea Company, Equity No. 797, and SAME vs. Jordon-Marsh Company, Equity No. 790, may be introduced read and used in behalf of the defendant in this cause with the same force and effect as though regularly taken and introduced herein subject to all the objections made and entered at the time of the taking of such depositions, viz:

1. The deposition of John P. Estabrook, of Warren Ohio.
2. The deposition of Pearl M. Long, of Warren, Ohio.
3. " " " George B. Sawyer, of Warren, Ohio.
4. " " " Charles B. McCurdy, of Warren, Ohio.
5. " " " Fred W. Roberts, of Lakewood, Ohio.

6. "Defendant's Exhibit No. 1. 1900 Catalogue of the Warren Electric & Specialty Company."
7. "Defendant's Exhibit No. 2. 1901 Catalogue of the Warren Electric & Specialty Company."
8. "Plaintiff's Exhibit A. Catalogue of the Company for 1903" (marked for identification.)
9. "Plaintiff's Exhibit B. Catalogue of the Company for 1904." (marked for identification.)
10. "Defendant's Exhibit 3. Schedule of Machinery Transferred to Peerless Electric Company July 31, 1902."
11. "Defendants's Exhibit 4. Duplicate Schedule of Machinery sold to the Peerless Electric Company."
12. "Defendant's Exhibits 4, 5, 6, 7 and 8, respectively, Schedules of Property Transferred from the Warren Electric & Specialty Company to the Peerless Electric Company in 1908."
13. "Defendant's Exhibit 9. Transformer Book of the Warren Electric & Specialty Company."
14. "Defendant's Exhibit No. 10. The F. W. Roberts Company, 1900-1901 Ledger."

And it is further stipulated and agreed that the aforesaid Exhibits introduced during the taking of said depositions may be delivered to and remain in the custody of counsel for defendant herein (subject to the right of examination and use by counsel for plaintiff, on due notice) until the trial or hearing of this cause.

J. L. STACKPOLE,
Counsel for Plaintiff.
MELVILLE CHURCH,
Counsel for Defendant.

DISTRICT COURT OF THE UNITED STATES,

DISTRICT OF MASSACHUSETTS.

AMERICAN ELECTRIC WELDING COMPANY & THOMSON SPOT WELDER COMPANY, Plaintiffs,

vs.

HOUGHTON & DUTTON COMPANY, Defendants.

EQUITY.

No. 794

AMERICAN ELECTRIC WELDING COMPANY & THOMSON SPOT WELDER COMPANY, Plaintiffs,

vs.

GEORGE BORGFELDT & COMPANY, Defendants

EQUITY.

No. 795.

AMERICAN ELECTRIC WELDING COMPANY & THOMSON SPOT WELDER COMPANY, Plaintiffs,

vs.

S. S. KRESGE COMPANY, Defendant.

EQUITY.

No. 796.

AMERICAN ELECTRIC WELDING COMPANY & THOMSON SPOT WELDER COMPANY, Plaintiffs,

vs.

GRAND UNION TEA COMPANY, Defendant.

EQUITY.

No. 797.

AMERICAN ELECTRIC WELDING COMPANY & THOMSON SPOT WELDER COMPANY, Plaintiffs,

vs.

JORDON-MARSH COMPANY, Defendant.

EQUITY.

No. 790.

Depositions *de bene esse* taken in behalf of the Defendants, pursuant to notice and by agreement and under the Statutes of the United States and Equity rules, at the office of The Peerless Electric Company, in Warren, Trumbull County, State of Ohio, beginning at 1:30 o'clock P. M., September 20, 1917, before George T. Hecklinger, Esq., a duly qualified Notary Public in and for Trumbull County, State of Ohio.

APPEARANCES: ALEN D. KENYON, Esq., for American Electric Welding Company; J. L. STACKPOLE, Esq., and DANIEL J. LYNE, Esq., for Thomson Spot Welder Company; ROBERT CUSHMAN, Esq., for Houghton & Dutton Company, George Borgfeldt & Company, S. S. Kresge Company and Grand Union Tea Company; and JOHN C. KERR, Esq., for Jordon-Marsh Company.

It is hereby stipulated by and between the parties, by their respective counsel, that these depositions may be taken at one and the same time in and for all of the above entitled causes, and may be entitled in all of said causes, and may be used with the same force and effect as though taken and entitled separately in and for all of said causes.

It is further stipulated that any deposition, which may be taken in behalf of the Plaintiffs, may be similarly taken and entitled in and for all of said causes at one and the same time, in the same manner and with the same effect as hereinbefore stipulated with respect to Defendant's depositions.

IN THE UNITED STATES DISTRICT COURT,

NORTHERN DISTRICT OF OHIO,

EASTERN DIVISION.

THOMSON SPOT WELDER COMPANY, a corporation, Plaintiff,

vs.

THE NATIONAL ELECTRIC WELDER COMPANY, a corporation, FRED P. MCBERTY, N. A. WOLCOTT, H. C. MILLIGAN, S. S. KURTZ, T. H. KANE, R. R. DANGELEISEN, C. R. JAMISON, WELDING PATENTS INVESTIGATING COMMITTEE, AND THE FEDERAL MACHINE & WELDER COMPANY, a corporation, Defendants.

EQUITY.

No. 431.

APPEARANCES: DANIEL J. LYNE, Esq., & J. L. STACKPOLE, Esq., for the Plaintiff.
A. S. PATTISON, Esq., for the defendants, H. C. Milligan, S. S. Kurtz, T. H. Kane, R. B. Dangeleisen, C. R. Jamison, and Welding Patents Investigating Committee.

It is stipulated in the above entitled cause that the attached depositions of John B. Estabrook, George B. Sawyer, Pearl M. Long

and Charles Bordman McCurdy, taken today for use in the following Massachusetts cases, namely, American Electric Welding Company & Thomson Spot Welder Company vs. Houghton & Dutton Company, Equity No. 794, American Electric Welding Company & Thomson Spot Welder Company against George Borgfeldt & Company, Equity No. 795, American Electric Welding Company & Thomson Spot Welder Company vs. S. S. Kresge Company, Equity No. 796; American Electric Welding Company & Thomson Spot Welder Company vs. Grand Union Tea Company, Equity No. 797; and American Electric Welding Company & Thomson Spot Welder Company vs. Jordon-Marsh Company, Equity No. 790, may be offered in evidence with the same force and effect as though taken for use in this action.

The Plaintiff contends that there was no right to take these depositions in said action, and objects to their taking, and reserves the right to present this objection at the proper time, and to move, if necessary, that they be stricken from the files.

....., *Attorney for Plaintiff.*

....., *Attorney for above Defendants.*

JOHN B. ESTABROOK, a witness called by and on behalf of the defendants, having been duly sworn on oath, deposes and says:

Direct Examination by MR. CUSHMAN:

Question. What is your full name?
Answer. John B. Estabrook.
Q. Where do you live?
A. Warren, Ohio.
Q. What is your occupation?
A. Sales Manager and Secretary of The Peerless Electric Company.
Q. How long have you been connected with The Peerless Electric Company in any capacity?
A. Since its organization.
Q. When was it organized?
A. According to the record book it was during the summer of 1902.
Q. Are you one of the original stockholders in The Peerless Electric Company?
A. Yes, sir.
Q. What is the business of The Peerless Electric Company?
A. The manufacture of fan motors and power motors and electrical apparatus.
Q. And did the Company begin business as soon as it was organized?
A. So far as I know, yes, sir.
Q. Were you connected with The Warren Electric & Specialty Company?

A. Yes, sir.

Q. Where was their factory at and prior to the time The Peerless Electric Company was organized?

A. You mean at Warren, Ohio?

Q. Yes.

A. Practically on this same ground. The factory is right adjacent to this office.

Q. Is the factory still there?

A. Not there, no, sir. Part of it is a little further down the street, moved across the street.

Q. You mean the building has been moved?

A. Yes.

Q. Is The Warren Electric & Specialty Company out of business?

A. Yes, sir.

Q. What was the business of The Warren Electric & Specialty Company?

A. They manufactured incandescent lamps, fan motors and transformers.

Q. Did they style the product of their fan business under any trade mark or trade name?

A. Yes, sir. Originally "W. E. & S. CO." Later "Peerless".

Q. Did The Warren Electric & Specialty Company sell out its fan business to The Peerless Electric Company?

A. Yes, sir.

Q. Can you tell me when that was?

A. According to the records it was in the summer of 1902.

Q. In whose custody are the records and documents of The Peerless Electric Company?

A. The minute book only is in my custody. The balance of the books are in the custody of the Treasurer.

Q. What is the Treasurer's name?

A. W. C. Ward.

Q. Of this city?

A. Yes, sir.

Q. Are you familiar with the account books and other documentary matters of The Peerless Electric Company in your capacity as Secretary?

A. No. sir, I am not in the book-keeping department at all.

Q. I mean do you know what the books consist of, what they are; are you able to recognize and identify them?

A. You mean the book-keeping books?

Q. I mean the ledger and documents that belong to the archives of The Peerless Electric Company.

A. I cannot do that, no sir.

Q. Can you produce the minutes of the Stockholders' and Directors' meetings of The Peerless Electric Company?

A. Yes, sir.

Q. Will you kindly do so?

(Witness hands book to Mr. Cushman entitled "RECORD OF THE PEERLESS ELECTRIC COMPANY.")

Q. Does this book contain the records of The Peerless Electric Company from the beginning of its incorporation?

A. So far as I know. I have only been secretary for seven years.

Q. Who was your predecessor in that office?

A. E. W. Gillmer

Q. Was he one of the original stockholders and organizers of this Peerless Electric Company?

A. Yes, sir.

Q. Is he living?

A. No, sir.

Q. Did this book (referring to the minute book of The Peerless Electric Company which the witness handed to Mr. Cushman) come into your custody as successor of Mr. Gillmer, the former secretary?

A. Yes, sir.

It is stipulated that the book entitled "RECORD OF THE PEERLESS ELECTRIC COMPANY" may be left in the possession of The Peerless Electric Company without introducing it in evidence and that in lieu thereof the following transcript may be used with the same force and effect as the original book.

The following are the records referred to:

"The incorporators of The Peerless Electric Company hereby waive the giving of notice of opening books for subscription to the capital stock of said corporation. Warren, Ohio, June 12, 1902.

(Signed) T. H. GILLMER
ELMER W. GILLMER
E. E. NASH
W. C. WARD
JACOB PERKINS
JAMES W. HOLLOWAY
WILLIAM WALLACE"

"Warren, Ohio, June 1902.

"We hereby severally subscribe to the capital stock of The Peerless Electric Company the number of shares written opposite our respective names, and agree to pay therefor the sum of $ per share.

Names	*Shares*
T. H. Gillmer	420
Elmer W. Gillmer	660
E. E. Nash	120
W. C. Ward	52
Jacob Perkins	70
James H. Holloway	150
William Wallace	90"

"WAIVER OF NOTICE OF STOCKHOLDERS MEETING

Warren, Ohio, June 20, 1902.

"The undersigned, being all the subscribers to the capital stock of The Peerless Electric Company, and being all personally present, as below subscribed at the first stockholders' meeting, hereby waive the giving of notice of meeting for the purpose of electing Directors as provided by law.

Names	Shares
T. H. Gillmer	420
Elmer W. Gillmer	660
_____	120
_____	51
Jacob Perkins	70
James W. Holloway	150
William Wallace	90"

"FIRST STOCKHOLDERS' MEETING"

"In accordance with the waiver of notice of the time and place of holding a meeting for the purpose of electing Directors of The Peerless Electric Company, as shown on page 11 of this book, the said stockholders of said Company met at the office of T. H. Gillmer, 49 E. Market Street, Warren, Ohio, at 7 o'clock P.M. June 20, 1902. All the stockholders being present, either personally or by proxy as follows:

	Shares
T. H. Gillmer	420
Jacob Perkins	70
William Wallace	90
W. C. Ward	51
E. W. Gillmer	660
James W. Holloway	150
E. E. Nash (proxy)	120

"On motion it was resolved that the Board of Directors of The Peerless Electric Company be composed of seven persons.

"An election for Directors was then held by ballot, which resulted as follows:

"T. H. Gillmer, Elmer W. Gillmer, Jacob Perkins, William Wallace, W. C. Ward, E. E. Nash and James W. Holloway each received 1561 votes; and said persons were duly declared elected as Directors by Jacob Perkins and W. C. Ward, who acted as inspectors of election.

"Said inspectors appointed the first meeting of the Directors to be at the office of T. H. Gillmer, 49 E. Market Street, Warren, Ohio, at 8 o'clock P.M., June 20, 1902.

"On motion stockholders meeting adjourned.

(Signed) T. H. GILLMER,
Chairman Secretary."

"State of Ohio, Trumbull County, ss.:

"Before me personally came T. H. Gillmer, Elmer W. Gillmer, Jacob Perkins, E. E. Nash, J. W. Holloway, W. C. Ward and William Wallace, directors of The Peerless Electric Company, who, being first duly sworn severally, say that they will faithfully discharge the duties of directors of said Company to the best of their ability.

(Signed) T. H. GILMER
JACOB PERKINS
W. C. WARD
JAMES W. HOLLOWAY
WILLIAM WALLACE
ELMER W. GILLMER,
E. E. NASH.

"Signed in my presence and sworn to before me this 20th day of June, 1902.

(Signed) E. E. ROBERTS,
(Notary Seal) *Notary Public.*"

"Warren, Ohio, June 20, 1902.

"Pursuant to notice given by inspectors of election at stockholders' meeting of The Peerless Electric Company held June 20, 1902 at 7 o'clock P.M. the directors of said Company met at the office of T. H. Gillmer, 49 E. Market Street, June 20, 1902, at 8 P. M., and the oath faithfully to discharge the duties of director of said Company having been administered by E. E. Roberts, Notary Public, to all except E. E. Nash, who was absent, Mr. William Wallace was chosen chairman, and T. H. Gillmer secretary.

"On motion of T. H. Gillmer, the officers of said Board of Directors consist of President, Vice President, Secretary and Treasurer, the said Secreta y & Treasurer to be one person.

"Motion carried.

"An election was then held for President; and T. H. Gillmer was declared President.

"W. C. Ward was declared Vice President, and Elmer W. Gillmer was declared elected Secretary and Treasurer.

"On motion it was resolved to call 50 per cent of capital stock on or before August 10th.

"On motion the president was directed to prepare and submit rules for conducting the meetings of the Company, and by-laws for company.

"On motion, meeting adjourned.

(Signed) T. H. GILLMER, *Secretary.*"

"Warren, Ohio, June 23, 1902.

"An adjourned meeting of the Directors of The Peerless Electric Company was held at the office of T. H. Gillmer on

Monday evening, June 23. It was discussed as to whether a general manager should be elected; but for the present it was decided not to have this office.

"The prospects of the business was thoroughly discussed, and the Secretary was authorized to build a new building which would contain Japanning Oven, Plating Department, Buffing Rooms, etc. This building was to be one story and a basement high for the present, and located on the rear of the property west of the "Economy" building, in such a position it would not interfere with the proposed extensions, pencil drawings of which were submitted.

"It was unanimously decided to purchase the Economy Company real estate at $5500.00, the house and lot west of it from E. W. Gillmer at cost, which amounted to $768.00, and from The Warren Electric & Specialty Company all of their real estate west of the driveway, 15 feet wide, which lies at the west of their present plant. This last named property contains several buildings, and all of these buildings, together with real estate, it was decided to purchase at their value to be determined upon mutually between the Directors of the two Companies. It was also decided to offer The Warren Electric & Specialty Company $30,000.00 for the good will, patents and the copyrighted name "Peerless," as applying to everything else which their copyright covered except incandescent lamps.

"It was also decided to purchase their patterns, machinery, furniture and fixtures and the finished and unfinished product of the fan and transformer departments, the machinery and furniture and fixtures alluded to are all of the machinery, tools, fixtures and implements used in the manufacture of fans, transformers and motors, and in fact all of the business of The Warren Electric & Specialty Company, together with the appliances of manufacture, except that portion devoted to the manufacture of incandescent lamps. The matter of assessment on the capital stock was talked over but was not decided, but left open until such time as would be determined what amount would be necessary to complete the purchase of the above mentioned, and also to give a sufficient amount of working capital.

"On motion of J. W. Holloway, seconded by E. W. Gillmer, the meeting was adjourned subject to the call of the President.

"Those present were T. H. Gillmer, William Wallace, Jacob Perkins, W. C. Ward, J. W. Holloway and E. W. Gillmer. E. E. Nash being absent."

"Warren, Ohio, June 20, 1902.

"We, the undersigned, do hereby agree to pay for the number of shares of The Peerless Electric Company set opposite our names at par, and to pay for same upon call of assessments by the directors of the Company.

NAMES	*SHARES*
E. E. Roberts	10 shares
E. E. Nash	120 "
Pearl Long	20 "
Fred P. McBerty	15 "
George B. Sawyer	15 "
J. W. Powers	15 "
J. W. Holloway	150 "
W. C. Ward	51 "
T. H. Gillmer	330 "
Jacob Perkins	100 "
William Wallace	80 "
J. W. Holloway	200 "
P. L. Webb	200 "
Richard Sibson	60 "
Elmer W. Gillmer	1789 "

"Warren, Ohio, August 8, 1902.

"At a meeting of the Directors of The Peerless Electric Company, held at the office of The Warren Electric & Specialty Company on Friday, August 8, it was decided to complete the purchase from The W. E. & S. Co. of their real estate above their present building where their offices are located. The amount to be paid was as per inventory $14,745.17, and to pay E. W. Gillmer $768.00 for the house and lot west of the Economy building, and to pay The Economy Company $5,500.00 for their real estate and buildings, and to purchase of The W. E. & S. Co. machinery amounting to $8661.67, furniture and fixtures $2002.90, patterns $3475.00, transformers and transformer material $12,123.81, fan motor and fan motor material $20,500.37, the shopright to make electrolier ceiling fans $500.00, and $30,000.00 for the good will of the fan and transformer business and for the use of the copyrighted trade mark "Peerless," as applied to every thing which it covers, except incandescent lamps. In order to do this an assessment of 50 per cent on the capital stock was made and declared payable at once. It was unanimously decided to place insurance amounting to One Thousand Dollars each on the brick buildings, and to place insurance to the amount of 20 per cent of the value on the contents in the warehouses, and not to place any insurance on the contents of the office building, but to place 80 per cent insurance of the value on the wooden building and its contents.

"The Secretary was unanimously instructed to complete the buildings now under way and to equip them with furniture and machinery, and to purchase material, and to get the company organized under way at the earliest possible moment. He was also instructed to divide the salaries of employees working for both companies in an equitable way. A discussion was held

in regard to water-rights, and it was decided to drill some wells, and a determination as to the future water supply would be reached upon their completion.

"Those present were T. H. Gillmer, Elmer W. Gillmer, E. E. Nash, J. W. Holloway, W. C. Ward and William Wallace. Mr. Perkins being absent.

"Meeting adjourned."

"At a directors' meeting held at the office of the Company on West Market Street on Monday afternoon, October 13 at 4 P.M., it was unanimously decided to purchase 4 boilers and engine, a belt, and some shafting from Virginia parties. Machinery that had been used in The Griswold Linseed Oil Mill for $4,100. It was also decided to install them in the new brick power house at once, and to engage in the manufacture of power motors on a large scale, and to erect large and commodious brick buildings at once, or if not possible to get them built this fall to at least get the foundations in. It was also decided to accept Mr. Thornton's proposition to come as draftsman for three months at $100.00 per month, with an advance afterwards, if he proved satisfactory. And to make an arrangement with F. P. McBerty for one year from November 1st at the rate of $1750.00 per year. And to do this it was decided to assess all stock at present subscribed, namely $225,000.00 par value, 10 per cent more, making 60 per cent, and to sell the balance, $275,000.00, at 60 cents on the dollar, with the understanding that it was not to be further assessed.

"Present T. H. Gillmer, E. W. Gillmer, William Wallace, J. W. Holloway, Jacob Perkins.

"All of the above was informally done, but all agreed.

"On motion J. W. Holloway, seconded by E. W. Gillmer, meeting adjourned at 6 P. M."

Q. Mr. Estabrok, upon the transfer of the fan and transformer business from The Warren Electric & Specialty Company to The Peerless Electric Company did The Peerless Electric Company begin the manufacture of "Peerless" electric fans?

A. Yes, sir.

Q. Does The Peerless Electric Company still make "Peerless" electric fans?

A. Yes, sir.

Q. Do they make anything else?

A. Motors and generators, and special electric apparatus.

Q. I show you two catalogues, purporting to be catalogues of The Warren Electric & Specialty Company, relating to "Peerless" fans, do you recognize them?

A. Yes, sir.

Q. What are they?

A. They are catalogues which were turned over to The Peer-

less Electric Company when they bought out The Warren Electric & Specialty Company.

Q. Were you familiar with the advertising matter of The Warren Electric & Specialty Company previous to the transfer of the fan business to The Peerless Electric Company?

A. To some extent, yes, sir.

Q. Can you tell us whether or not catalogues like these two catalogues before you were published by The Warren Electric & Specialty Company previous to that transfer?

A. They were, sir.

Q. In what year was this catalogue, which I show you (handing witness catalogue) published?

A. 1900.

(Mr. Cushman: The catalogue, referred to by the witness, is introduced in evidence and marked "DEFENDANTS EXHIBIT NO. 1, 1900 CATALOGUE OF THE WARREN ELECTRIC & SPECIALTY COMPANY.")

Q. Will you look at the other Warren Electric & Specialty Company's catalogue and tell us in what year that was published?

A. 1901.

(Mr. Cushman: The catalogue, referred to by the witness, is offered in evidence and marked DEFENDANTS' EXHIBIT 2, 1901 CATALOGUE OF THE WARREN ELECTRIC & SPECIALTY COMPANY.")

Q. Upon the purchase of the electric fan and transformer business from The Warren Electric & Specialty Company in the summer of 1902, what was done with the machinery, fixtures, materials and parts in process, and other things pertaining to the fan and transformer business of The Warren Electric & Specialty Company?

A. I lived in Ravenna at that time, and I cannot answer you in detail as to that.

Q. How far away is Ravenna?

A. Twenty-four (24) miles.

Q. Did you come to Warren frequently during that time?

A. Yes, sir.

Q. Somewhere about that time were the things, referred to, moved from the factory of The Warren Electric & Specialty Company?

A. As I remember it, as soon as the large building was completed the machine shop and machinery was all moved from the Economy building over into the big new brick building.

Q. Before that was all moved from the Warren Electric & Specialty Company's factory into the Economy building?

A. I can't tell you that.

Q. Well, you knew it got into the Economy building, didn't you?

A. Yes, they ran the machine shop in the Economy building for quite a little while.

Q. For the manufacture of fans?

A. Yes, sir.

Q. And later moved the fan equipment from the Economy building into the new building?

A. Yes, sir.

Q. When did you return from Ravenna?

A. 1905 I believe, sir.

Q. Will you look at these papers I now show you, and tell us what they are?

A. From the description and heading, they are lists of equipment, furniture, fixtures, machinery, etc., that the Warren Electric & Specialty Company sold to The Peerless Electric Company.

Q. Are these documents, which you have produced here, out of the records of The Peerless Electric Company?

A. Mr. Hoffman got these from the vault.

Q. Who is Mr. Hoffman?

A. He is manager of the Production Department of The Peerless Electric Company.

Q. Do these papers constitute part of the records of The Peerless Electric Company as you know them in your capacity as Secretary of that corporation?

A. Why, I take it they are. I have never seen them before that I know of. I cannot recognize them as Secretary of the Company.

Direct examination closed.

(Mr. Stackpole: Counsel for Plaintiff objects to the entire Direct Examination of this witness as incompetent, immaterial and irrelevant, and to Defendants' Exhibits 1 and 2 as immaterial, irrelevant and not proved.)

(It is agreed that these objections are seasonably taken.)

Cross-examination by MR. STACKPOLE, Counsel for Thomson Spot Welder Company (without waiving objections).

Q. Were you employed by The Warren Electric & Specialty Company?

A. Yes.

Q. In what capacity?

A. I simply was in different capacities in the factory.

Q. In what years?

A. From 1894 to 1899.

Q. What part of the year does the fan season begin?

A. We contract for them about the first three months in the year, and ordinarily commence shipping about the first of March.

Q. What personally did you have to do with getting out Defendants' Exhibit 1?

A. I gave it to Mr. McBerty.

Q. What do you mean by that?

A. Handed it to him.

Q. When?

A. I think about three or four months ago.

Q. I don't mean getting it out in that sense. What did you personally have to do with its preparation at the time it was made up?

A. Nothing, sir.

Q. Did you have anything to do with its distribution?

A. No, sir.

Q. Did you have anything to do with getting up Defendants' Exhibit 2, at the time it was gotten up?

A. No, sir.

Q. Or its distribution?

A. No, sir.

Q. When did you first see Defendants' Exhibit 1?

A. Both here and at Ravenna, the years they were issued.

Q. By whom were you employed during these years?

A. Colonial Electric Company.

Q. Where was that located?

A. Ravenna.

Q. When did you first see Defendants' Exhibit 2?

A. The year it was published.

Q. How do you fix that date?

A. From the fact I was back and forth all the time, and I sold some of these fans from Ravenna.

Q. You have referred to January, February and March as the season when the contracts are made for the fans of a certain year. What contracts do you mean?

A. Contracts with the jobbers and our customers to whom we sell the fans.

Q. And the catalogues were prepared for making those contracts and selling the fans?

A. Yes, sir.

Q. Have you ever seen a 1902 catalogue of The Warren Electric & Specialty Company relating to fans?

A. I can't answer that, I cannot tell you.

Q. Why are you uncertain about this?

A. I cannot tell whether the 1902 were put out in the name of The Warren Electric & Specialty Company or The Peerless Electric Company .

Q. Have you got a 1902 catalogue of either The Warren Company or The Peerless Company?

A. I will have to look that up and see if I can find one. I cannot tell you without looking.

Q. Did The Peerless Company get out a catalogue for its fans in 1903?

A. Yes, sir.

Q. Did they get out catalogues for their fans in subsequent years up to 1906?

A. Yes, sir.

Q. You think you could find samples of these catalogues?

A. I would be glad to try.

Q. I would be glad to have you produce, if you can, the catalogue of either The Warren Company or The Peerless Company for 1902, and the catalogues of The Peerless Company from that time on to 1906, if you can do so.

A. Right away?

Q. How long would it take you to look?

A. I don't think over ten minutes.

Q. Will you please make a search?

(Witness leaves the room to make search.)

(Witness returns to room in which this hearing is being held.)

Q. Have you made search?

A. Yes, sir.

Q. Did you find a catalogue of either The Warren Company or The Peerless Company of 1902?

A. I did not.

Q. You found catalogues of The Peerless Company for 1903 and 1904?

A. Yes, sir.

Q. Are you willing to loan these catalogues to us during the pendency of this suit, leaving them in the custody of the examiner in the Court?

A. Yes, sir.

(The two catalogues from The Peerless Electric Company, of 1903 and 1904, are marked by the Notary for identification as "PLAINTIFFS' EXHIBIT A, CATALOGUE OF THE COMPANY FOR 1903", and "PLAINTIFFS' EXHIBIT B, CATALOGUE OF THE COMPANY FOR 1904".)

(Mr. Chushman: Counsel for Defendants objects to the use of these catalogues, or any examination in relation

thereto, on the ground that they are immaterial, and that they are not cross-examination in reply to any matters inquired of on Direct Examination.)

Q. Did you also find an advertisement of The Warren Electric & Specialty Company of a fan, which advertisement is dated March, 1902, in "The American Electrician"?

A. Yes, sir.

Q. On pages 46 and 47 of said "American Electrician" for March, 1902?

A. Yes.

Q. From where did you obtain "Defendants' Exhibits 1 and 2"?

A. From the scrap-book in which we keep all advertising material.

Q. Was it from that same scrap-book that you obtained the Peerless catalogues for 1903 and 1904?

A. Yes, sir.

Q. Did you find in that scrap-book any catalogue of either The Warren Company or The Peerless Company for 1902?

A. No, sir, I did not.

Q. I notice that "DEFENDANTS' EXHIBIT 1", before it was offered in evidence today, had on it in ink the following: "WARREN ELECTRIC & SPECIALTY COMPANY 1900 CATALOGUE, GEORGE T. HECKLINGER, NOTARY PUBLIC". Do you know why this writing appears on this catalogue?

A. No, sir.

Q. On Defendants' Exhibit 2 appears in ink: "Warren Electric & Specialty Company 1901 catalogue, Exhibit A, George T. Hecklinger, Notary Public". Do you know why this writing appears on this catalogue?

A. No, sir.

Q. Did you have anything to do with putting this writing on these two exhibits?

A. No, sir.

Q. Do you know what this writing indicates?

A. No, sir.

Q. In looking through your scrap-book of catalogues and advertisements I notice a page with what appears to be the outside cover of a catalogue pasted to it, and the rest of the catatlogue has been removed. This page follows one containing an advertisement dated September, 1901, and precedes another page containing an advertisement on which is written "December 27, 1902", and another page on which is an advertisement marked "January 1902". Can you tell me if the catalogue, which seems to have been torn out, was the 1902 catalogue of either The Peerless Company or The Warren Company?

A. I cannot say definitely.
Q. What do you think?
A. I think it was.
Q. Of which Company?
A. I cannot say definitely, sir.

(Mr. Stackpole: In view of the testimony of the witness on Cross-Examination, the objection to his testimony on direct is renewed; and the Plaintiffs' reserve the right, at a certain time, to move for the cancellation of his deposition and the exclusion of the exhibits offered by the defendants.)

Cross-examination closed.

Re-direct examination by MR. CUSHMAN:

Re-D. Q. While you were working for the Colonial Electric Company at Ravenna did you sell fans of the manufacture of the Warren Electric & Specialty Company before they sold their business to the Peerless Company?
A. Yes, sir.

(Mr. Cushman: That is all).

Re-direct examination of witness closed.

(Signed) JOHN B. ESTABROOK.

Attest:
(Signed) GEO. T. KECKLINGER,
Notary Public.

Notarial Seal.

PEARL M. LONG.

PEARL M. LONG, a witness called by and on behalf of the defendants, having been duly sworn on oath, deposes and says:

Direct Examination by MR. CUSHMAN.

Question. What is your name?
Answer. Pearl M. Long.
Q. You live in Warren?
A. Yes, sir.
Q. By whom are you employed?
A. By The Peerless Electric Company.
Q. In what capacity?
A. That of book-keeper.
Q. Were you ever in the employ of The Warren Electric & Specialty Company?
A. Yes.

Q. When was that?

A. In the fall of 1899.

Q. How long did you continue with The Warren Electric & Specialty Company?

A. Only a short time. I cannot recall just how long.

Q. Were you with them until they sold out the fan business to The Peerless Electric Company?

A. No.

Q. By whom were you employed in between?

A. By The Economy Electric Company.

Q. How long were you employed by The Economy Electric Co.?

A. I would say about a year.

Q. When did you go to work for The Peerless Electric Company?

A. At the time they were organized in 1902.

Q. Were you employed by them as book-keeper?

A. Yes, sir.

Q. I show you a book entitled "Sales Ledger No. 1, Peerless Electric Company." Do you know what that book is?

A. Yes, sir.

Q. What is it?

A. That is the oroginal first sales ledger of The Peerless Electric Company.

Q. By whom was this book kept?

A. I kept it.

Q. Will you refer to some of the early entries and tell us the dates of the first sales of electric fans by The Peerless Electric Company?

A. Do you want the very first sale?

Q. Yes, the earliest sale.

A. August 11, 1902.

Q. To whom were some sales made August 11, 1902?

A. Illinois Electric Company, of Chicago, Illinois. I find another sale under date of August 30, 1902, to The W. G. Nagle Electric Company of Toledo, Ohio.

Q. Then the earliest sale of an electric fan completed by The Peerless Electric Company was August 11, 1902, was it?

A. Yes.

Q. Were there sales of fan parts and supplies around that date also?

A. Yes.

Q. Point out one or two early sales of that kind.

A. On August 11, 1902, there were sales of parts made to The Electric Supply & Engineering Company of Detroit, Michigan. Also on the same date to Stanley & Patterson Company of New York City.

Q. From that time did The Peerless Electric Company engage continuously in making and selling so-called "PEERLESS FANS?"

A. Yes, sir.

Q. Where was the factory of The Warren Electric & Specialty Company before they sold out their fan business?

A. In the wooden building just east of this Peerless office building.

Q. Is that building there now?

A. No, it has been removed.

Q. Did The Warren Electric & Specialty Company go out of business?

A. They sold out.

Q. After The Warren Electric & Specialty Company sold out the fan business to The Peerless Company, do you recall where the machinery and fixtures, and parts, etc., were moved?

A. No, I do not recall that.

(It is stipulated that in lieu of introducing the ledger referred to by the witness, the entries testified to by this witness may be used with the same force and effect as though the book itself were introduced in evidence.)

Direct examination closed.

(Mr. Stackpole: The deposition of this witness is objected to as being immaterial and irrelevant. And it is agreed that this objection is seasonably taken.)

(Mr. Stackpole: No cross-examination.)

Examination of witness closed.

(Signed) PEARL M. LONG.

Attest:—

(Signed) GEO. T. HECKLINGER,
Notary Public.

Notarial Seal.

GEORGE B. SAWYER.

GEORGE B. SAWYER, a witness called by and on behalf of the defendants, having been duly sworn on oath, deposes and says:

Direct examination by MR. CUSHMAN:

Question. What is your full name?

Answer. George B. Sawyer.

Q. You live in Warren, Ohio?

A. Yes, sir.

Q. What is your occupation?

A. At the present time I am employed in the purchasing department of The Peerless Electric Company.

Q. How long have you been in the employ of The Peerless Electric Company?

A. Well, ever since the Company was organized, which was about 15 years ago, or a little better.

Q. By whom were you employed before that?

A. Warren Electric & Specialty Company.

Q. How long were you in the employ of The Warren Electric & Specialty Company?

A. About three years.

Q. And did you go directly from the employ of The Warren Electric & Specialty Company to The Peerless Electric Company at the time The Warren Electric & Specialty Company sold out the fan business to The Peerless Electric Company?

A. Yes, sir.

Q. I show you two catalogues, marked "Defendants' Exhibit 1" and "Defendants' Exhibit 2." Do you recognize them?

A. Yes, sir.

Q. What are they?

A. They are catalogues representing the fan types manufactured by The Peerless Electric Company.

Q. Do you mean manufactured by The Peerless Electric Company?

A. Manufactured by The Warren Electric & Specialty Company, known as "PEERLESS FAN."

Q. When was The Warren Electric & Specialty Company's catalogue, Exhibit 1, published?

A. It is a catalogue representing the 1900 product. The catalogue was probably published in 1899. We got those catalogues out in the winter, probably in December.

Q. When was The Warren Electric & Specialty Company's catalogue, Exhibit 2, published?

A. The catalogue itself was undoubtedly published and printed in 1900, along in December probably.

Q. Did you have anything to do with making up the inventory of properties taken over by The Peerless Electric Company from The Warren Electric & Specialty Company in the summer of 1902?

A. I had something to do with the inventory. Possibly not in making up the schedules or listing the property, but more particularly in pricing these schedules after the property had been listed.

Q. I show you some papers, containing lists of properties, and ask you what they are, this whole bunch (indicating several sheets of paper writing)?

A. Well, those schedules and lists show machinery and tools, furniture and fixtures and raw material of various kinds, and finished product purchased by The Peerless Electric Company from The Warren Electric & Specialty Company.

Q. Referring to the document entitled at the top "Warren Electric & Specialty Company, machinery transferred to The Peerless Electric Company July 31, 1902," and the date "1902," in whose handwriting are the parts I have quoted?

A. The written part "Warren Electric & Specialty Company, machinery transferred to The Peerless Electric Company, July 31, '02" I would say was in the handwriting of Mr. E. W. Gillmer. The date "1902" is in my handwriting.

Q. Were those words written there on the dates named?

A. I would suppose that they were.

Q. Is Mr. Gillmer living?

A. He is dead.

Q. In whose handwriting is the body of the schedule of the document referred to? And if it is in the handwriting of more than one person, please tell us whose hands appear in it.

A. I think the body of this schedule, being the one bearing date 1902, is in the handwriting of Miss Dunbar.

Q. Is she living?

A. She is not living. The figures, or prices, on the margin are in my handwriting; and part of the body on page 7 of the schedule is in my handwriting; also a part of the last two pages of the schedule.

Q. Were the parts, which are in your handwriting, made at the time this schedule is dated?

A. They were.

Q. Can you identify in this schedule "a welding machine" as one of the items taken over by The Peerless Electric Company from The Warren Electric & Specialty Co.?

A. The welding machine is listed on page 8th of the schedule, and is the 10th item "one welding machine."

Q. Did you place check marks opposite the item "one welding machine"?

A. I did.

Q. At the time of the transfer from The Warren Electric & Specialty Company to The Peerless Electric Company in 1902, did The Warren Electric & Specialty Company possess more than one welding machine?

A. Not to my knowledge. There was only one in use around the plant, and that was the particular machine mentioned in the schedule.

(Mr. Cushman: The schedule identified by the witness is offered in evidence, and marked "DEFENDANTS' EXHIBIT 3, SCHEDULE OF MACHINERY TRANSFERRED TO PEERLESS ELECTRIC COMPANY JULY 31, 1902.")

Q. I show you another document, which appears to be a typewritten duplicate of the schedule shown in Exhibit 3, is this merely a duplicate of the same schedule, so far as you know?

A. I think it is. I am satisfied it is.

Q. And was this made at the same time (referring to the duplicate)?

A. Approximately the same time.

Q. I notice at the head of this duplicate schedule, a bill head of The Warren Electric & Specialty Company, with the words "Sold to The Peerless Electric Company, Warren, Ohio." In whose handwriting are those latter words?

A. "Peerless Electric Company, Warren, Ohio" is in my handwriting.

(Mr. Cushman: I offer the duplicate schedule in evidence, marked "DEFENDANTS' EXHIBIT 4, DUPLICATE SCHEDULE OF MACHINERY SOLD TO THE PEERLESS ELECTRIC COMPANY.")

Q. I also show you four other schedules, marked DEFENDANT'S EXHIBITS 5, 6, 7 and 8," and ask you what those are respectively?

A. Exhibit 5 represents tools and shop fixtures and office furniture and fixtures. Exhibit 6 is a typewritten copy of Exhibit 5 Exhibit 7 is a listing of material used in the construction of transformers, and also included a list of finished transformers partly finished transformers. Exhibit 8 is, in the main, a listing of material used in the manufacture of "Peerless fans," and also includes a listing of fan parts.

Q. In whose handwriting are the words at the beginning of Exhibit 5: "W. E. & S. Co. F & F transferred to Peerless 7-31-02," and below "1902"?

A. The words "W. E. & S. Co. F & F transferred to Peerless 7-31-02" are in the handwriting of E. W. Gillmer, to the best of my knowledge. The date, written in ink, "1902," is in my handwriting.

Q. In whose handwriting is the body of this schedule, Exhibit 5?

A. To the best of my knowledge it is the writing of Miss Dunbar. Next to the last page of the schedule are a number of items in my handwriting. Part of the price extensions are in my handwriting and partly in the handwriting of Miss Dunbar.

Q. In whose handwriting is the written part of Exhibit 6?

A. The handwritten part of the schedule referred to is in my handwriting.

Q. In whose handwriting is the handwritten part of Exhibit 7?

A. That is also in my handwriting.

Q. In whose handwriting is the handwritten part of Exhibit 8?

A. That is also in my handwriting.

Q. Were these schedules, Exhibits 3 to 8 inclusive, all made out at about the same time?

A. Yes, sir.

Q. And was that time the time that they were dated, namely, in July 1902?

A. Yes, sir.

Q. And was the property listed in these schedules transferred from The Warren Electric & Specialty Company's plant to The Peerless Company's plant at that time?

A. Yes, sir. Let me qualify that. I will say, either shortly before or shortly after.

Q. Was the physical transfer of these articles made at about the time, shortly before or shortly after, and within a matter of a few days, or a longer period?

A. A matter of a few days.

(Mr. Cushman: The schedules, referred to as Exhibits 4, 5, 6, 7 and 8, are introduced in evidence as "DEFENDANTS' EXHIBITS 4, 5, 6, 7 and 8 respectively, SCHEDULES OF PROPERTY TRANSFERRED FROM THE WARREN ELECTRIC & SPECIALTY COMPANY TO THE PEERLESS ELECTRIC COMPANY IN 1902.")

Q. Was the machinery and other property, listed in these schedules, Exhibits 3 to 8, inclusive, transferred at the time of the sale from The Warren Electric & Specialty Company's building to the so-called "Economy Building" owned by The Peerless Company?

A. Yes, sir.

Direct examination closed.

(Mr. Kenyon: I will now cross-examine the witness, without waiving any objections heretofore made.)

Cross-examination by Mr. Kenyon.

Q. I notice the last item in Defendants' Exhibit 5 reads as follows: "100 fan catalogues $3.00." What were those?

A. I take it they were fan catalogues of The Warren Electric & Specialty Company, showing different types of fans manufactured by them.

Q. What issue of catalogue?

A. I would suppose that was the 1901 catalogue.

Q. I notice a charge is made for these. That shows, I suppose, that these catalogues were ones that they were then using?

A. Undoubtedly.

Q. What was the last fan catalogue they had gotten out prior to August 1902?

A. 1901.

Q. You mean the one published in 1901 for the season of 1902?

A. The one published for the season of 1901.

Q. When was that gotten out?

A. That was undoubtedly printed possibly in December 1900.

Q. Was it the custom of The Warren Company to get out a catalogue each year?

A. Each year that they manufactured fans. The Warren Electric & Specialty Company did not always manufacture fans.

Q. Did they manufacture fans in 1902?

A. Yes.
Q. Did they get out a catalogue for 1902?
A. I suppose they did.
Q. That would be the regular course of business, would it not?
A. Yes.
Q. And that would be the fan that is referred to in these items?
A. Yes, that catalogue listed in this schedule must have been the catalogue representing the 1902 product.
Q. Published about December 1901?
A. Yes, I would suppose so. I crossed myself in my first statement as to when that catalogue was published. I take it for granted that is the case, because the 1902 catalogue is represented in this schedule, and was printed in 1901 in December.

(Mr. Kenyon: That is all.)

Cross-examination of witness closed.

(Signed) GEO. B. SAWYER.

ATTEST:
(Signed) GEO. T. HECKLINGER
(Notarial Seal) *Notary Public*

CHARLES B. McCURDY.

CHARLES B. McCURDY, a witness called by and on behalf of the Defendants, having been duly sworn on oath, deposes and says:

Direct-examination by MR. CUSHMAN.

Question. What is your full name?
Answer. Charles B. McCurdy.
Q. Where do you live?
A. 323 Mahoning Avenue, Warren, Ohio.
Q. What is your occupation at the present time?
A. Secretary & Treasurer of The Enterprise Electric Company.
Q. Of Warren, Ohio?
A. Of Warren, Ohio.
Q. What is the business of The Enterprise Electric Company?
A. Transformer manufacturers.
Q. Were you ever employed by The Warren Electric & Specialty Company of Warren, Ohio?
A. Yes.
Q. When?
A. I was there from 1899 to 1905. From the first of the year in 1899 until about the first of September, 1905.
Q. Was there a change of business from The Warren Electric & Specialty Company to The Peerless Electric Company during that time?

A. Yes.

Q. When was that?

A. I can't say just when that change was made.

Q. But whenever it was made you continued with that same business and were then employed by The Peerless Electric Company?

A. Yes.

Q. What were your duties with The Warren Electric & Specialty Company before it was transferred.

A. I had charge of the transformer department.

Q. Did you have charge of the manufacturing?

A. Yes.

Q. Did you keep any record of transformers manufactured by that Company?

A. Yes.

Q. What did that record show?

A. It showed complete data of every transformer that was manufactured; also when it was manufactured; when it was shipped and to whom it was shipped.

Q. Did you, at some time while you were in charge of the transformer department, make a special transformer which was delivered to the fan department of The Warren Electric & Specialty Company?

A. Yes.

Q. What were the characteristics of that transformer which made it differ from the usual run of transformers, if there were any?

A. The voltage of the secondary side was very low. That is, it was so low it could not be used for any lighting purposes.

Q. For what purposes were the transformers that The Warren Electric & Specialty Company made, that is its general product?

A. For lighting service.

Q. For what service was this special transformer that you referred to?

A. For welding.

Q. For whom was that made?

A. The Pneumatic Wheel Company of Freehold, New Jersey.

Q. Refreshing your recollection from the transformer book, when was that transformer made and shipped to The Pneumatic Wheel Company?

A. (Referring to the transformer book.) It was made and shipped in June 1900.

Q. Have you got the entry, referring to that transformer, in that transformer book?

A. I have.

Q. Will you kindly produce the transformer book?

(Witness produces book.)

Q. Is this (referring to the book which the witness produced) the transformer book you referred to, showing the types and dates

of shipment of all transformers made by The Warren Electric & Specialty Company?

A. Yes.

Q. By whom was this book kept?

A. It was kept originally by H. W. Wiswell, who was at that time the engineer.

Q. Was it kept under your supervision as head of the transformer department?

A. No. You will have to excuse me, I don't remember just when Wiswell left there, but he left some time in 1900. This record here (pointing to entry in the book) will show you, you see he entered this.

Q. How do you happen to have this transformer book of The Warren Electric & Specialty Company in your possession?

A. As being the original record of all transformers manufactured since The Warren Electric & Specialty Company started to make transformers, it was turned over to The Peerless Electric Company when they purchased the transformer business from The Warren Electric & Specialty Company. In 1906 Mr. McBerty and I purchased the transformer business from The Peerless Electric Company, and they in turn turned it over to us.

Q. It is now one of the records of The Enterprise Electric Company?

A. It is now one of the records of The Enterprise Electric Company.

Q. As successor to The Warren Company and The Peerless Company?

A. Yes. That (referring to the transformer book) forms part of a continuous record from the first transformer until the present.

Q. Will you show us the entry of the special transformer that was made for The Pneumatic Wheel Company, about which you have already testified?

A. This one here on pages 30 and 31, which reads as follows: "Serial No. 654, Type C, 2500 wats, primary 250 volts, secondary 2-2.5-3-3.5-4 volts; total primary turns 500, tapped at 222-250-286-333-400 turns; total secondary turns one; size primary wire 12 square B & S; size secondary 8 wires .8 X .1; weight primary wire 27 pounds; weight secondary wire 18 3/4 pounds; weight of iron and copper total 105 pounds; bake number 43; transformer wound June 18, 1900, shipped June 27, 1900 to The Pneumatic Wheel Company, Freehold, New Jersey. Warren Electric & Specialty Company Order No. 20440".

Q. What happened to that transformer after it was shipped to The Pneumatic Wheel Company of Freehold, New Jersey?

A. This transformer was returned to the transformer de-

partment of The Warren Electric & Specialty Company some time between June and December of 1900.

Q. What did you do with it after it was returned?

A. I turned it over to the fan motor department of January 20, 1901.

Q. How do you fix that date?

A. By the record that I have quoted from.

Q. Will you read the memorandum that enables you to fix that date?

A. "Fan motor department 1-20-01".

Q. In whose handwriting is that last entry?

A. Mine.

Q. Is that the date on which you delivered this particular transformer into the fan department of The Warren Electric & Specialty Company?

A. Yes.

Q. Did you make that entry at the time?

A. Yes.

Q. Do you know what that transformer was used for after it was delivered to the fan department?

A. It was used for welding fan guards.

Q. I mean into what machine did it go, did it go into a welding machine?

A. Well, of course, it would have to go into a welding machine if there was to be welding.

Q. What was done with the transformer?

A. It was placed in a machine for welding fan guards.

Q. Was there more than one welding machine in The Warren Electric & Specialty Company at that time?

A. No.

Q. Or at any time, so far as you know?

A. No.

Q. Do you know who built that welding machine, or had it built?

A. No, I do not.

Q. Did you see that welding machine after the transformer was put into it?

A. Yes.

Q. And did that welding machine, with the same transformer, continue in use up to the time The Warren Electric & Specialty Company sold out to The Peerless Electric Company?

A. Yes.

Q. And continued in use by The Peerless Company after the transfer as long as you remained in the employ of The Peerless Company?

A. Yes, so far as I know. They might have discontinued it at some time, but I don't know.

Q. Did the Warren Electric & Specialty Company make any

other transformers of this particular type suitable for welding machines?

A. One.

Q. What was that one?

A. It was a machine of practically the same characteristics as the one I have just mentioned, with ten times the capacity.

Q. For whom was that made?

A. The Pneumatic Wheel Company.

Q. The same concern?

A. The same concern that the first transformer originally went to.

Q. If I understand you correctly, the first one was a small one and was returned for lack of capacity?

A. As I understand it, The Pneumatic Wheel Company were not certain whether they could successfully weld electrically; and my understanding is, they ordered this small machine to demonstrate with, with the understanding that it would be returned in the event of their ordering a larger machine for the same purpose, having enough capacity to do their commecial welding.

(Mr. Stackpole: I object to the answer as being hearsay.)

Q. The first machine, as you understand it, was returned because it was of too small capacity, and you later built another similar machine of larger capacity?

A. Yes.

Q. And those were the only two machines of that type that you built while with The Warren Electric & Specialty Company?

A. Yes.

Q. Will you explain, using the transformer book if necessary, the difference between the transformer which you first sent to The Pneumatic Wheel Company, and the general product of The Warren Electric & Specialty Company?

A. At that time the standard voltage for lighting transformers was 1000-2000 volts primary; and 100-200 volts secondary. This voltage applied to transformers for general lighting purposes.

(Mr. Cushman: The transformer book, testified to by the witness, is offered in evidence, and marked "DEFENDANTS' EXHIBIT 9. TRANSFORMER BOOK OF THE WARREN ELECTRIC & SPECIALTY COMPANY.")

(Mr. Cushman: That is all.)

Direct examination closed.

Cross-examination by MR. STACKPOLE:

Q. This transformer, that was sent to The Pneumatic Wheel Company, was returned and went into the fan department, was a 2 1/2 kilowatt transformer?

A. Yes.
Q. And the secondary gave 2 1/2 volts?
A. Yes.
Q. What was the amperage of it?
A. 1000.

(Mr. Stackpole: That is all.)

Cross-examination closed.

(Signed) CHAS. B. McCURDY.

Attest:
(Signed) GEO. T. HECKLINGER,
Notary Public.

(Copy)

DISTRICT COURT OF THE UNITED STATES,
DISTRICT OF MASSACHUSETTS.

AMERICAN ELECTRIC WELDING COMPANY &
THOMSON SPOT WELDER COMPANY, Plaintiffs,
vs.
HOUGHTON & DUTTON COMPANY, Defendant.
EQUITY No. 794.

AMERICAN ELECTRIC WELDING COMPANY &
THOMSON SPOT WELDER COMPANY, Plaintiffs,
vs.
GEORGE BORGEFELDT & COMPANY, Defendants.
EQUITY No. 795.

AMERICAN ELECTRIC WELDING COMPANY &
THOMSON SPOT WELDER COMPANY, Plaintiffs,
vs.
S. S. KRESGE CO., Defendant.
EQUITY No. 796.

AMERICAN ELECTRIC WELDING COMPANY &
THOMSON SPOT WELDER COMPANY, Plaintiffs,
vs.
GRAND UNION TEA COMPANY, Defendant.
EQUITY No. 797.

AMERICAN ELECTRIC WELDING COMPANY &
THOMSON SPOT WELDER COMPANY, Plaintiffs,
vs.
JORDON-MARSH COMPANY, Defendant.
EQUITY No. 790.

DEPOSITION de bene esse taken in behalf of the defendants by agreement and under the statutes of the United States and

Equity Rules at the office of The F. W. Roberts Company, corner of Prospect and East 4th Streets, Cleveland, Cuyahoga County, State of Ohio, beginning at 10 o'clock A. M. October 27, 1917, before John H. Cousins a duly qualified Notary Public in and for Cuyahoga County, State of Ohio.

Appearances: ALAN D. KENYON, ESQ., for the Plaintiffs,
and
ROBERT CUSHMAN, ESQ. for defendants Houghton & Dutton Co., George Borgfeldt & Co., S. S. Kresge Co., Grand Union Tea Co., and also appearing for the purposes of this deposition, for the defendants Jordan-Marsh Company.

It is hereby stipulated by and between the parties, by their respective counsel, that this deposition may be taken and used in all the above entitled cases in accordance with and subject to the stipulations entered into at the opening of the depositions taken in said cases at Warren, Ohio, on September 30, 1917, before George T. Hecklinger, Esq., Notary Public.

FRED W. ROBERTS.

FRED W. ROBERTS, a witness called by and on behalf of the defendants, having been duly sworn on oath, deposes and says:

Direct Examination by MR. CUSHMAN:

Question. Please state your name, age, residence and occupation.
Answer. F. W. Roberts, 54 years old, printing and stationery business, and I live at Lakewood, Ohio.
Q. With what concern are you connected?
A. The F. W. Roberts Company.
Q. Of Cleveland, Ohio?
A. Yes.
Q. Is The F. W. Roberts Company engaged in the business of printing and stationery?
A. Yes.
Q. How long has that concern been in that business?
A. Thirty-five years.
Q. How long have you been connected with it?
A. Thirty-five years.
Q. Are you the head of that business?
A. Yes.
Q. And have you always been so since the founding of the business?
A. I have.
Q. Did you ever know of the Warren Electric & Specialty Company, of Warren, Ohio?

A. Yes.

Q. Has The F. W. Roberts Company done printing work for them?

A. Yes, sir.

Q. I show you a catalogue of The Warren Electric & Specialty Company, marked "DEFENDANTS' EXHIBIT NO. 2—1901 CATALOGUE OF THE WARREN ELECTRIC & SPECIALTY COMPANY", do you recognize it?

A. I do.

Q. Who printed that catalogue?

A. The F. W. Roberts Company.

Q. Who had personal charge of the negotiations relating to the printing of that catalogue?

A. To the best of my recollection, I did.

Q. What officer or representative of The Warren Electric & Specialty Company did you see about it?

A. Mr. Gillmer, T. H. I think are his initials.

Q. Refreshing your recollection from any records of The F. W. Roberts Company, which you may have, please tell us when the issue of catalogues, like "DEFENDANTS' EXHIBIT 2", was sold to The Warren Electric & Specialty Company.

(Mr. Kenyon: I object, on the ground that no basis has been made to show that the witness is competent to testify on that point.)

A. On or about March 19, 1901.

Q. What was the amount of the bill for this issue of the catalogues?

A. To the best of my recollection it was $345.55.

Q. And when was that charge paid for?

A. May 10, 1901.

Q. Can you form an estimate at this time as to about how many catalogues that charge would represent?

A. It is a rough guess on my part, but from Three to Five Thousand. There is a change in the values between that time and this. That is the best I can answer it.

Q. Have you the record showing the sale to which you have testified?

A. Only the ledger account.

Q. What other records, or books, were kept at that time beside the ledger?

A. The order would be first made out for the work ticket, and factory and miscellaneous time tickets computed to fill out the original work ticket. When the job was completed the work ticket would be turned into the office to be charged up and a bill made of it, which bill would be copied in the bill book, and entered into the ledger from there.

Q. Are there any of the tickets, bill books, or other records,

which you have mentioned, relating to this sale to The Warren Electric & Specialty Company, now in existence?

A. Not to my knowledge. All tickets and copy books are destroyed or torn up five (5) years after the entry is made, with the exception of the ledger.

Q. Can you produce the ledger referred to, which is the only existing book, as I understand it, covering that time?

A. There it is (indicating a book).

Q. Please read the ledger entries showing the sale of the "Exhibit No. 2" catalogue to The Warren Electric & Specialty Company.

A.

	"March			1901
		Book		
Name & Address	*Date*	*Page*	*Ck*	*Debit*
Economy Elect. Co. successors to Warren Elect. & Specialty Co. Warren, O."	19	646	E	345.55

Q. Please explain the words "Economy Elect. Co. successors to", which are written over the name "Warren Elect. & Specialty Co. Warren, Ohio", so far as you are able.

A. The entry, as I see it today, looks as if, some time during the life of the ledger, the name "Warren Electric & Specialty Company" was changed to The Economy Electric Company. And "The Economy Elect. Co." appears to be written in in different ink.

Q. Which name appears to be the original entry, from its position on the page and the appearance of the ink, etc.?

A. "The Warren Electric & Specialty Company".

Q. Was this ledger a book kept by The F. W. Roberts Company in the regular course of its business?

A. Yes, sir.

Q. Do you know in whose handwriting these entries, to which you have referred, are?

A. I do not remember.

Q. Was the book kept under your supervision?

A. Yes, sir.

Q. Are the entries true to your best knowledge and belief?

A. Yes, sir.

Q. I note that the entries, which you have quoted from the account of The Warren Electric & Specialty Company, are taken out of the ledger account running from October 1st, 1900 through September 1901. What is your reason for testifying that the charge of March 19, 1901, is a charge for the 1901 catalogue of The Warren Electric & Specialty Co.?

A. The amount that a catalogue of that size, and the quantity usually used by a firm in that line of manufacture, would run into about that amount of money.

Q. Is there any other charge against The Warren Electric & Specialty Company during that whole year which would cover the issue of a catalogue such as this (referring to Defendants' Exhibit No. 2)?

A. There is not. The other items are much smaller.

Q. What do the other items cover, as far as you recall?

A. Miscellaneous printing, and office supplies furnished them.

Q. What does the entry of March 19, 1901 signify in respect to the time when this issue of the catalogue was delivered to The Warren Electric & Specialty Company?

A. The date, within three or four days, of the last shipment of this issue of catalogues to them.

Q. What was the practice of The F. W. Roberts Company in respect to making the ledger entry with reference to the time of the shipment?

A. Charged on our books as soon as the last shipment was made, if it was made in piecemeal.

Q. If it was made all at once, what?

A It would be the same.

Mr. Cushman: I ask that the ledger, to which the witness has testified, be marked "DEFENDANTS' EXHIBIT NO. 10—THE F. W. ROBERTS COMPANY, 1900-1901 LEDGER"

(Ledger was so marked)

At the request of the witness, it is stipulated that the ledger, "Defendants' Exhibit No. 10 may be left in the possession of the witness, and that the foregoing testimony and transcript of entries may be used in lieu of the book itself, unless the Court, or either of the parties should call for the production of the same on due notice.

Direct examination closed.

Cross-examination by MR. KENYON (without waiving objections heretofore taken):

Q. Do you know in whose handwriting these entries are, which have been quoted into the record from the ledger?

A. I do not remember.

Q. They are not in your handwriting?

A. No, sir. They are in the handwriting of one of the staff of bookkeepers.

Q. Are any of the entries on this page (indicating) of the ledger in your handwriting?

A. No, sir.

Q. You stated that the ledger is kept under your supervision. Will you explain what you mean by that?

A. The entire book-keeping system is under my supervision, and the book-keeper is under my immediate directions daily.

Q. I suppose the same is true of all the other departments of your business?

A. Yes, but more particularly the book-keeping, because I am in the office more than I am in the factory.

Q. How often do you supervise your book-keeping in making entries in the ledger?

A. Once a month.

Q. What do you do once a month in this supervision?

A. Go over all the accounts on the ledger.

Q. Do you check up every item of each account, or is it only a general going over?

A. Only a general going over.

Q. You do not attempt to supervise and test the accuracy of every entry in the ledger, or every account in your business?

A. No, sir.

(Mr. Kenyon: In view of the above testimony, the entire deposition of the witness, with reference to the entries in the ledger, or based thereon, is objected to as being immaterial, irrelevant and incompetent, and not the best evidence.)

Q. What is there about this catalogue, Defendant's Exhibit No. 2, that you recognize so that you can testify that it is the work of your firm?

A. The design on the cover was my suggestion to Mr. Gillmer; and I am generally familiar with the different styles of type which we have used in our printing department in past years.

Q. Have you stated all the facts that enable you to recognize it as printing work of your firm?

A. I have a good memory for remembering work that has been done in the house, and particularly that which I personally had to do with; and I am positive that this is work done in our house, as per my testimony.

Q. You have stated one or two facts that enable you to say this was work done by your concern. If there are any others please state them.

A. There is a heading at the top of the pages of "Peerless Fan," of special design, that I was particularly fond of, and it is not a standard type. That is to say, it is a lettering, or drawing, photographed and cuts made of it, that make it different than could be made from any foundry type in general use in printing offices. There is no other thing that I can see about it that would make it more definite than I have already stated.

Q. Does the name of your concern appear on the catalogue anywhere?

A. Not that I can observe.

Q. Did you use this peculiar type "Peerless Fan" in any other catalogue for The Warren Electric & Specialty Company?

A. Not that I remember of.

Q. Did you print other catalogues for them at any other time besides this one before you, "Defendants' Exhibit No. 2"?

A. The work done for The Economy Electric Company, or The Warren Electric & Specialty Company, or The Peerless Electric Company, all of which T. H. Gillmer was the head of, extended over a period of years, too far back to remember the different work done for the companies.

Q. You did other work for The Warren Electric & Specialty Company than this catalogue, "Defendants' Exhibit No. 2," did you?

A. Yes, sir.

Q. Did you do much?

A. We did considerable work for the three companies over a period, I would say, of six or seven years.

Q From about what time to what time?

A. From about 1900 to 1907 or 1908.

Q. Did you print other catalogues than "Defendant's Exhibit No. 2" for any of these concerns?

A. I think we did, but I have no definite recollection of it.

Q. Did you print a catalogue of 1900 for The Warren Electric & Specialty Company?

A. I do not remember.

Q. Have you no means of ascertaining?

A. I suppose if we checked up our old records we could find out whether we did or not; but we have not done so.

Q. Will you please do so, or have it done?

A. No. I don't want to do it if it is not absolutely necessary. It takes considerable time and trouble and expense, because it takes the time of a man I need for other work.

Q. How did you find the ledger entries you have testified to?

A. Mr. Cushman come in and asked our bookkeeper to check up such entries, which he did, with the results testified to.

Q. What do you mean by "such entries"?

A. He asked if we had printed a catalogue for The Warren Electric & Specialty Company about the period of 1901.

Q. And you found it?

A. And we found the entry, and testified to.

Q. You didn't look up to see whether you printed a catalogue for The Warren Electric & Specialty Company in 1900?

A. No, sir.

Q. Will you please look that up, or have it looked up?

(Mr. Cushman: The question is objected to, on the ground that it is not cross-examination relating to any matter inquired of on direct examination. It already appears in evidence that the record is before counsel, covering the period from October

1st, 1900, to October 1st, 1901, which covers the period pertinent to this inquiry.)

Q. Did you print any catalogue for The Warren Electric & Specialty Company in 1902?

(Mr. Cushman: The same objection.)

A. I do not remember.
Q. Have you looked that up?
A. No, sir.
Q. Please look up, or have it looked up, in your ledger, and see whether you have any entries of the printing of a catalogue for The Warren Electric & Specialty Company in 1900, prior to October, and also in 1902, to see if you printed a catalogue for them in that year.

(Mr. Cushman: The objection is repeated; and it is pointed out that, if counsel for the plaintiffs desires any evidence outside the scope of the Direct Examination, the witness is available to be called as a witness for the plaintiffs.)

A. I have an appointment, and my bookkeeper has an appointment and my appointment is now due, and it cannot be done at this time.

(Mr. Kenyon: I protest against the objections of defendants counsel, and the apparent unwillingness and refusal of the witness to make the search in question, as the same has a direct and material bearing on the direct testimony of the witness already given. And I now ask how long it will take to look these records up, and ask that they be produced later in the day. What time can you have them?)

(The Witness: I am willing to have our book-keeper look it up, although he is about to take a train to leave the city; and I have an engagement in five (5) minutes; and our books are stored away in the basement, very inaccessible and hard to get at.)

Q. What is there on this catalogue, "Defendants' Exhibit No. 2," and on the ledger entries, that you have read into the record, which show that this identical catalogue, "Defendants' Exhibit No. 2," is the one referred to in the ledger entry rather than some other catalogue, or some other publication, that you printed for The Warren Electric & Specialty Company?

A. It is my recollection of printing the catalogue for them, in connection with the amount being about such as would be charged for that amount of work, as I would judge from being in the printing business for the last thirty-five years.

Q. Is there any other reason, and if so, state it, that makes you

think that this catalogue, "Defendants' Exhibit 2," is the identical publication referred to in the ledger entry?

A. No other reason I think of.

Q. What other publications have you made for The Warren Electric & Specialty Company besides catalogues?

A. It is too far back to remember.

Q. Have you any recollection whatever of having printed a catalogue for that Company in 1900?

A. No, sir.

Q. Have you any recollection of having printed a catalogue for them in 1902?

A. No, sir.

Q. Aside from what you have testified about this catalogue, "Defendants' Exhibit 2", have you any independent recollection of having printed a catalogue for that Company in 1901?

A. I have not. And I would further say I would not have of this catalogue if my memory had not been refreshed by it being brought before me, and entries on the books looked up.

Q. If you printed any other catalogues besides "Defendants' Exhibit 2" for The Warren Electric & Specialty Company, can you say, of your own knowledge, that this bill was not for that catalogue rather than for this catalogue here before you, Defendants' Exhibit 2"?

(Mr. Cushman: I object, unless the hypothetical catalogue is identified by time, or the approximate time.)

(Mr. Kenyon: I withdraw the question.)

Q. If you had printed a catalogue for The Warren Electric & Specialty Company for the year 1900, or 1902, could you, of your own knowledge, say that these entries in the ledger, which you have referred to, do not refer to either one of these catalogues, rather than to this catalogue, "Defendants' Exhibit 2"?

A. Not without looking up our records during those years to refresh my memory.

Q. What is there in the printed matter about "Defendants' Exhibit 2" that indicates to your mind the date, that is the year when it was published? I do not refer to any of the written matter on it that has been put on recently, I refer only to the printed matter.

A. Nothing.

Q. So that, if you did at any time print another "Peerless" catalogue for The Warren Electric & Specialty Company about the same six as Defendants' Exhibit 2, the entry in the ledger, so far as you know, would apply equally to such catalogue as to Defendants' Exhibit 2, is that so?

A. If I did, yes.

(Mr. Kenyon: I think that is all.)

Cross-examination closed.

Re-direct Examination by MR. CUSHMAN:

Q. Calling your attention to the title page of the catalogue on which is printed "Season of 1901", does that indicate to your mind that the catalogue was not printed in 1902?

A. It certainly does.

Q. Does it also indicate that the catalogue was not printed before October 1st, 1900?

A. I would say so.

Q. Referring to your supervision of the Ledger, Defendants' Exhibit 10, was you supervision such that, if there had been a mistake in the entries, it would have come to your notice?

A. I think so, yes.

Q. Is this ledger, Defendants' Exhibit 10, the book on which The F. W. Roberts Company relies in its dealings with its customers?

A. Entriely.

Q. Has your book-keeper found the ledger of The F. W. Roberts Company for the period preceding Defendants' Exhibit 10, covering the period from September 1, 1898 to September 30, 1900?

A. He has. I find in the ledger from September 1898 to October 1, 1900, one item which could possibly be big enough to cover the issue of a catalogue, and that entry is of November 25, 1899, amounting to $252.20, which might possibly be a catalogue; but I cannot state positively whether it is or not. My book-keeper has looked up and finds no entries against The Warren Electric & Specialty Company for the year beginning October 1901 to October 1902.

(Mr. Cushman: That is all.)

Re-direct examination closed.

(Signed) FRED W. ROBERTS

—: CERTIFICATE :—

I, John H. Cousins, a Notary Public within and for Cuyahoga County in the State of Ohio, do hereby certify that the foregoing deposition of Fred W. Roberts was taken before me on behalf of the defendants for use in the above entitled cases by agreement on the 27th day of October 1917, at Cleveland, Cuyahoga County, State of Ohio. That said deposition was taken at the office of The F. W. Roberts Company, corner of Prospect Avenue and East 4th Street in said Cleveland. That said witness was by me duly cautioned and sworn before the commencement of his testimony to tell the truth, the whole truth and nothing but the truth. That in accordance with agreement the testimony of said witness was taken

down stenographically by me, and was subsequently by me reduced to typewriting. That the testimony of said witness after it was reduced to writing was read over by him and was signed by him before me. That upon the completion and signing of said deposition it was taken into my custody and is now by me sealed up and addressed to the Court. That the exhibit introduced in evidence during the taking of testimony of the aforesaid witness, duly marked and attested by me, was by agreement of counsel left in the custody of the witness. That I am not of counsel or attorney for any of said parties, nor connected by blood or marriage with any of said parties, nor interested directly or indirectly in the matter or controversy.

IN WITNESS WHEREOF I hereunto set my hand and affix my seal of office at Cleveland, Cuyahoga County, State of Ohio, this 8th day of November, 1917.

(Signed) JOHN H. COUSINS,
Notary Public.

(Notarial Seal)

IN THE DISTRICT COURT OF THE UNITED STATES,

FOR THE EASTERN DISTRICT OF MICHIGAN,

SOUTHERN DIVISION.

THOMSON SPOT WELDER COMPANY, PLAINTIFF,

vs.

FORD MOTOR COMPANY, DEFENDANT.

IN EQUITY—ON HARMATTA PATENT, NO. 1,046,063

Deposition of Howard A. Coombs, taken pursuant to agreement in behalf of the defendant at the Office of Church & Church, 604 McGill Building, Washington, D. C., on the 11th day of April, 1919, before Thomas Durant, a notary public in and for the District of Columbia.

PRESENT: J. L. Stackpole, Esq., in behalf of plaintiff. Melville Church, Esq., in behalf of defendant.

HOWARD A. COOMBS.

HOWARD A. COOMBS, being called as a witness in behalf of the defendant, and duly sworn, deposes and says in answer to questions propounded to him by Mr. Church as follows:

Question 1. Please state your name, age, residence and occupation?

Answer. Howard A. Coombs; age, 46; residence, Washington, D. C.; occupation, patent attorney and expert.

Q. 2. State what your educational advantages and training have been to qualify you to testify as a translator of French and German letters patent for mechanical inventions and particularly inventions relating to the art of electric welding?

A. I graduated in mechanical engineering from the Worcester Polytechnic Institute. For several years preceding my entering the Institute in 1890, I lived in Switzerland where I attended private schools conducted in the French and German languages. I learned to read, understand and speak those languages. After graduating from the Institute in 1893, I worked in various places as an engineer until, in 1896, I was appointed an assistant examiner in the Patent Office, where I remained for over seven years. During the last six of these years I was assigned to one of the metal working divisions and examined applications for inventions for various kinds of machine tools and other metal working machines and processes. For the greater part of the time I had charge of the examination of applications for electric welding and other welding inventions. Since 1903 I have practiced before the Patent Office

and Courts, having my office in Washington, and have made a specialty of foreign search work and translations. I have testified as an expert witness in a considerable number of suits, both as a mechanical expert and as a translator.

A great deal of my time has been given to reading and translating patents and publications on technical matters in the French and German languages, and I am thoroughly familiar, consequently, with technical French and German.

Q. 3. I show you what purports to be a certified copy of German letters patent to Nikolas von Benardos, dated May 8, 1889, No. 50,909, in German, and ask you to state whether or not you have read this patent in the original and understand the structure therein described and shown?

A. Yes, I have read this patent in the original and understand the invention described therein.

Q. 4. I have asked you to prepare a translation of the text of this German patent into English. If you have done so, will you please produce the same?

A. I have made a translation of this patent and now hand you a typewritten copy of said translation.

Q. 5. What have you to say as to the accuracy and faithfulness of this translation?

A. I believe that the translation which I have made of this patent is an accurate and faithful translation of the original German text.

Q. 6. I show you what purports to be a certified copy of French patent to Egel, dated October 13, 1903, No. 335,889, in French, and ask you if you have read and understand said patent and the subject matter therein disclosed.

A. Yes, I have read the patent you mention and fully understand the invention therein disclosed.

Q. 7. I have asked you to make a translation of said Egel patent, No. 335,889, into English. If you have done so will you please produce the same.

A. I have made the translation of this patent and hand you a typewritten copy of my translation in English.

Q. 8. What have you to say as to the accuracy and faithfulness of this translation?

A. I fully believe that my said translation is a faithful and accurate one of the original French text.

Q. 9. I now show you a certified copy of French patent to Egel, of October 13, 1903, No. 336,187, in French, and ask you if you have read and understand said patent and the subject matter therein disclosed.

A. Yes, I have read the patent you mention and fully understand the invention therein disclosed.

Q. 10. I have asked you to make a translation of said Egel patent No. 336,187, into English. If you have done so will you please produce the same?

A. I have made the translation of this patent and hand you a typewritten copy of my translation in English.

Q. 11. What have you to say as to the accuracy and faithfulness of this translation?

A. I fully believe that my said translation is a faithful and accurate one of the original French text.

Q. 12. State whether or not you are interested directly or indirectly in the result of this controversy?

A. No, I am not interested either directly or indirectly in this litigation.

Defendant offers in evidence the following:

Copy of United States Letters Patent to Thomson, No. 347,140, marked "Defendant's Exhibit No. 1".

Copy of United States Letters Patent to Thomson, No. 347,141, marked "Defendant's Exhibit No. 2".

Copy of United States Letters Patent to Benardos and Olezewski,, No. 363,320, marked "Defendant's Exhibit No. 3".

Copy of United States Letters Patent to Thomson, No. 396,015, marked "Defendant's Exhibit No. 4".

Copy of United States Letters Patent to Dewey, No. 432,727, marked "Defendant's Exhibit No. 5".

Copy of United States Letters Patent to Coffin, No. 437,571, marked "Defendant's Exhibit No. 6".

Copy of United States Letters Patent to Thomson, No. 444,928, marked "Defendant's Exhibit No. 7".

Copy of United States Letters Patent to Blanchard, No. 466,266, marked "Defendant's Exhibit No. 8".

Copy of United States Letters Patent to Thomson, No. 496,019, "Defendant's Exhibit No. 9".

Copy of United States Letters Patent to Lemp, No. 531,197, marked "Defendant's Exhibit No. 10".

Copy of United States Letters Patent to Lemp, No. 553,923, marked "Defendant's Exhibit No. 11".

Copy of United States Letters Patent to Robinson, No. 574,942, marked "Defendant's Exhibit No. 12".

Copy of United States Letters Patent to Kleinschmidt, No. 616,436, marked "Defendant's Exhibit No. 13".

Copy of United States Letters Patent to Burton, No. 647,694, marked "Defendant's Exhibit No. 14".

Copy of United States Letters Patent to Perry, No. 670,808, marked "Defendant's Exhibit No. 15".

Copy of United States Letters Patent to Hunter, No. 690,958, marked "Defendant's Exhibit No. 16".

Copy of United States Letters Patent to de Ferranti, No. 874,398, marked "Defendant's Exhibit No. 17".

Copy of United States Letters Patent to Rietzel, No. 928,701, marked "Defendant's Exhibit No. 18".

Copy of United States Letters Patent to de Ferranti, No. 1,148,221, marked "Defendant's Exhibit No. 19".

Certified copy of British Patent to Parkinson, No. 14,536 of 1894, marked "Defendant's Exhibit No. 20".

Certified copy of British Patent to de Ferranti, No. 11,921 of 1903, marked "Defendant's Exhibit No. 21".

Certified copy of British Patent to Harmatta, No. 22,981 of 1903, marked "Defendant's Exhibit No. 22".

Certified copy of French Patent to Egel, No. 335,889, marked "Defendant's Exhibit No. 23".

Original translation of French Patent to Egel, No. 335,889, marked "Defendant's Exhibit No. 24".

Certified copy of French Patent to Egel, No. 336,187, marked "Defendant's Exhibit No. 25".

Original translation of French Patent to Egel, No. 336,187, marked "Defendant's Exhibit No. 26".

Certified copy of German Patent to Benardos, No. 50,909, marked "Defendant's Exhibit No. 27".

Original translation of German Patent to Benardos, No. 50,909, marked "Defendant's Exhibit No. 28".

Printed copy of application, as filed, of Harmatta Patent No. 1,046,066, marked "Defendant's Exhibit No. 29".

Certified copy of the File Wrapper, Contents and all drawings in the matter of Letters Patent to S. Z. de Ferranti, No. 1,148,221, marked "Defendant's Exhibit No. 30".

Certified copy of File Wrapper, Contents and Drawings in the matter of Pending Application of S. Z. de Ferranti, Serial No. 688,464, marked "Defendant's Exhibit No. 31".

Certified copy of File Wrapper and Contents of Letters Patent No. 1,046,066, to Johann Harmatta, marked "Defendant's Exhibit No. 32".

Certified copy of File Wrapper and Contents of Interference No. 30,709, between application of de Ferranti, Serial No. 668,464, and Patent No. 1,046,066, to Harmatta, marked "Defendant's Exhibit No. 33".

Certified copy of File Wrapper and Contents of Letters Patent No. 928,701, to Adolph F. Rietzel, marked "Defendant's Exhibit No. 34".

Certified copy of File Wrapper and Contents of Interference No. 31,792, between Patent No. 928,701, to Rietzel, and application for Harmatta Patent No. 1,046,066, marked "Defendant's Exhibit No. 35".

Certified copy of Assignment of Application Serial No. 183,677, for Harmatta Patent No. 1,046,066, from Johann Harmatta to Thomson Electric Welding Company, dated February 3, 1912, marked "Defendant's Exhibit No. 36".

Certified copy of Assignment of Application Serial No. 247,081, for Rietzel Patent No. 928,701, from A. F. Rietzel to Thomson Electric Welding Company, of Maine, dated March 23, 1905, marked "Defendant's Exhibit No. 37".

Certified copy of Assignment by Thomson Electric Welding Company, of Maine, of all its assets, to the Thomson Electric

Welding Company, of Massachusetts, dated March 11, 1910, marked "Defendant's Exhibit No. 38".

Certified copy of Assignment of Rietzel Patent No. 928,701 from Thomson Electric Welding Company, of Maine, to Thomson Electric Welding Company, of Massachusetts, dated April 18, 1910, marked "Defendant's Exhibit No. 39".

Certified copy of Assignment of Harmatta Patent No. 1,046,066 and Rietzel Patent No. 928,701, from Thomson Electric Welding Company to Thomson Spot Welder Company, marked "Defendant's Exhibit No. 40".

Certified copy of Assignment dated June 8, 1917, of Application of S. Z. de Ferranti, Serial No. 668,464, from de Ferranti to F. L. Middleton, marked "Defendant's Exhibit No. 41".

Certified copy of Assignment dated July 2, 1917, of Application of S. Z. de Ferranti, Serial No. 668,464, from F. L. Middleton to Melville Church, marked "Defendant's Exhibit No. 42".

Certified copy of Assignment dated July 26, 1917, of Application of S. Z. de Ferranti, Serial No. 668,464, from Melville Church to H. C. Milligan, Trustee, marked "Defendant's Exhibit No. 43".

Original License, dated November 30, 1917, under application of S. Z. de Ferranti, Serial No. 668,464, from H. C. Milligan, Trustee, to Ford Motor Company, marked "Defendant's Exhibit No. 44".

Certified copy of Decree on Mandate, entered in suit of Thomson Electric Welding Company, et al. vs. Barney & Berry, Inc., under Harmatta patent No. 1,046,066 marked "Defendant's Exhibit No. 45".

Certified copy of Record in suit of Thomson Electric Welding Company, et al. vs. National Enameling & Stamping Company, marked "Defendant's Exhibit No. 46".

Certified copy of Original Docket Entries in suit of Thomson Electric Welding Company, et al. vs. United States Metal Products Company, marked "Defendant's Exhibit No. 47".

Copy of Pleadings in suit of Thomson Electric Welding Company, et al. vs. United States Metal Products Company, marked "Defendant's Exhibit No. 48".

Photographs taken by Defendant's Expert, F. L. Dyer, Esq., marked "Defendant's Exhibit No. 49, Dyer Photographs A-1 to A-6".

Photographs taken by Defendant's Expert, F. L. Dyer, Esq., marked "Defendant's Exhibit No. 50, Dyer Photographs B-1 to B-14".

Photographs taken by Defendant's Expert, F. L. Dyer, Esq., marked "Defendant's Exhibit No. 51, Dyer Photographs C-1 to C-8".

Signature and certificate waived.

UNITED STATES DISTRICT COURT,

EASTERN DISTRICT OF MICHIGAN,

SOUTHERN DIVISION.

THOMSON SPOT WELDER COMPANY, PLAINTIFF,

v.

FORD MOTOR COMPANY, DEFENDANT.

IN EQUITY—ON HARMATTA PATENT, NO. 1,046,066.

Deposition of WILLIAM FRIESS, a witness produced in behalf of the defendant, taken at the office of Messrs, Church & Church, 908 G Street, N.W., Washington, D. C., on the 9th day of May, 1919, before Thomas Durant, a notary public in and for the District of Columbia, pursuant to agreement.

PRESENT: J. L. Stackpole, Esq., for the plaintiff. Melville Church, Esq., for the defendant.

WILLIAM FRIESS.

WILLIAM FRIESS, being duly sworn, deposes and says as follows, in answer to questions put to him by Melville Church, Esq., of counsel for defendant:

Question 1. Please state your name, age, residence and occupation?

Answer. William Friess; age, thirty-eight years; residence, Clarendon, Virginia; occupation, clerk in the United States Patent Office.

Q. 2. How long have you been employed in the Patent Office.

A. Since June 23, 1898.

Q. 3. And in what department of the Patent Office are you at present employed?

A. The Docket Clerk's Room.

Q. 5. What character of work is handled in the Docket Clerk's Room?

A. We have charge of all printed testimony, original testimony, briefs and exhibits filed in contested cases; also set hearings before all of the tribunals of the Patent Office and send notices to the Court of Appeals of hearings in interference cases.

Q. 6. Are you familiar with the course of proceedings in the prosecution of applications for patents that are not involved in, or before they are involved in, contested proceedings with rival claimants?

A. I am.

Q. 7. Are you familiar with the practice of the Patent Office under Rule 75 in regard to the showing that is necessary to be made by an applicant whose application is rejected upon a foreign or domestic patent that shows but does not claim that he is claiming?

A. I am.

Q. 8. Where physical exhibits accompany affidavits filed under Rule 75, in whose custody are they primarily placed?

A. The physical exhibits, if any, are first given into the custody of the model custodian, Mr. Gill, and by him are delivered to the Primary Examiner having charge of the application in question.

Q. 9. In an application filed by Adolph F. Rietzel, on the 24th day of February, 1905, which resulted in patent No. 928,701, dated July 20, 1909, two affidavits appear to have been filed by the applicant under Rule 75, one verified October 23, 1908, and the other verified February 18, 1909. In the affidavit verified October 23, 1908, reference is made to a physical exhibit marked "Specimen of Pulley, C. F. Tischner, Jr., Notary Public". I have asked you to make search for this specimen of pulley. Please state whether or not you have found it?

A. I find attached to the affidavit of Rietzel, executed October 23, 1908, what appears to be a part of a metal pulley bearing a tag attached thereto marked, "Specimen of Pulley, C. F. Tischner, Jr., Notary Public", on one side, and on the other side, "Application of A. F. Rietzel, Metal Working, Filed February 24, 1905, S. N. 247,081", and bearing the Patent Office Stamp "November 30, 1908".

Q. 10. Will you give a little more particular description of this pulley?

A. It appears to be a part which is about one inch in diameter that is apparently struck up from a steel or iron plate so as to form what may be called a rim and hub portion. On the hub portion there appear to be projecting in the direction of the axis of the hub at intervals five raised portions or projections.

Q. 11. The affidavit of Rietzel, verified February 18, 1909, and filed March 13, 1909, also refers to certain exhibits, to-wit: "accompanying pieces of work marked, 'Specimen No. 1, D. M. Edsall, N.P.' and 'Specimen No. 2, D. M .Edsall, N.P.'; also pointed electrode the same in form as the accompanying electrode marked for identification, 'Welding Electrode, D. M. Edsall, N.P.'" Are these exhibits referred to now attached to the affidavit of Rietzel?

A. They are not.

Q. 12. Have you made search for them among the records of the Patent Office and in all likely places where such exhibits might be found, and if you have will you state what you have done in that connection?

A. I have made a thorough search for those exhibits and have been unable to locate them.

I find in the Rietzel file a letter dated March 12, 1909, addressed to the Commissioner of Patents, stating that,

> "We are sending you by Adams Express the specimens referred to in the affidavit of Adolph F. Rietzel, dated February 18, 1909 and filed with an amendment in the above case, dated March 3, 1909."

Indorsed upon this letter in red pencil there is the notation, "3 models to Mr. Gill, A.D.C.", which indicates that the specimens were in due course sent to the model custodian, Mr. Gill, by Mr. A. D. Cutts, the clerk then employed in the mail and express division. I find upon examination of a book kept by Mr. Gill that the receipt of the models by him was noted and an entry made indicating that they were forwarded in due course to the Primary Examiner in Division 3 having charge of the application. Following this clue, I went to the Examiners room in Division 3 and inquired of the Examiner and of his Assistants if those specimens were still in that division, or if they knew what had become of them. They made examination and reported that the specimens were not in the division. I then personally made an exhaustive search in the division and in all other likely places where such specimens might have been placed, but was unable to locate them. My belief is that they have become lost. From the description given of the specimens it was apparently impracticable to keep them attached to the papers in the file of the case and they were, being detached, probably mislaid and have become lost. At least a most diligent search on my part has resulted in a failure to find them.

Not only did I make inquiry of the Examiner and his Assistants in Division 3 to which this Rietzel case was assigned, but I personally examined the desks of the Examiner and of his Assistants and the cupboards and other places in the division, where such specimens would likely be placed, with no success. I not only made an examination in Division 3 to which these specimens were sent, but I also made a similar examination in Divisions 37 and 26, thinking that possibly the specimens might have been sent to either of these divisions. I also examined the records in the Docket Division and the models and exhibits filed in connection with contested cases and was unable to locate the specimens there. I know of no likely place in the Patent Office where these specimens might be found that I have not searched. I am, therefore, quite certain that these specimens are not now in the Patent Office.

I might add that from time to time sales are made of old models and parts that have been filed as specimens and exhibits in contested and uncontested cases, and it is quite possible that these particular specimens about which you inquire, being detached, were disposed of at one of these sales.

Certificate waived.

Vol. II.

TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, [redacted] 1923

No. [redacted] 120

THOMSON SPOT WELDER COMPANY, PETITIONER,

vs.

FORD MOTOR COMPANY.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT.

PETITION FOR CERTIORARI FILED SEPTEMBER 12, 1922.

CERTIORARI AND RETURN FILED DECEMBER 13, 1922.

(29,139)

(29,139)

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1922.

No. 589.

THOMSON SPOT WELDER COMPANY, PETITIONER,

vs.

FORD MOTOR COMPANY.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT.

VOLUME II.

INDEX.

		Original.	Print.
Testimony of	F. P. McBerty	225	711
	Otto F. Barthel	273	759
	F. P. McBerty (recalled)	276	762
	Edward B. Craft	287	773
	F. P. McBerty (recalled)	315	801
	John W. Farley	320	806
	F. P. McBerty (recalled)	331	817
Offers in evidence		359	845
Testimony of	F. P. McBerty (recalled)	362	848
	Jasper W. Powers	387	873
	John A. McDonald	392	878
	F. P. McBerty (recalled)	399	885
	Albertas C. Taylor	406	892
	John S. Gilder	416	902

JUDD & DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., FEBRUARY 23, 1923.

	Original.	Print.
Testimony of —— McElray	422	908
Fred G. Carter	427	913
Evrah C. Lipps	430	916
Francis S. Maguire	439	925
Correspondence	443	929
Testimony of William B. Ensor	468	954
John A. Estabrook (recalled)	472	958
F. P. McBerty (recalled)	474	960
William E. Smith	488	974
Mrs. Zella A. McBerty	490	976
John S. Gilder (recalled)	492	978
Edward L. Bettiker	492	978
James W. Powers (recalled)	495	981
A. W. Neeland	498	984
J. G. Wright	500	986
Frank E. Mills	502	988
M. L. Evely	505	991
John J. Findlater	507	993
Harry P. Prosser	509	995
Hubert E. Hartman	513	999
A. M. Wibel	515	1001
William H. Smith	517	1003
George B. Sawyer	521	1007
F. P. McBerty (recalled)	523	1009
Exhibit No. 1—U. S. Patent to Thompson, No. 347,140.	1	1021
Exhibit No. 2—U. S. patent to Thompson, No. 347,141.	6	1026
Exhibit No. 3—U. S. patent to Benardos, No. 363,320..	10	1030
Exhibit No. 4—U. S. patent to Thompson, No. 396,015.	17	1037
Exhibit No. 5—U. S. patent to Dewey, No. 432,727....	21	1041
Exhibit No. 6—U. S. Patent to Coffin, No. 437,751.....	25	1045
Exhibit No. 7—U. S. patent to Thompson, No. 444,928.	27	1047
Exhibit No. 8—U. S. patent to Blanchard, No. 466,266.	31	1051
Exhibit No. 9—U. S. patent to Thompson, No. 496,019.	33	1053
Exhibit No. 10—U. S. patent to Lemp, No. 531,197.....	38	1058
Exhibit No. 11—U. S. patent to Lemp, No. 553.923.....	45	1065
Exhibit No. 12—U. S. patent to Robinson, No. 574,942..	50	1070
Exhibit No. 13—U. S. patent to Kleinschmidt, No. 616,-436	56	1076
Exhibit No. 14—U. S. patent to Burton, No. 647,694....	59	1079
Exhibit No. 15—U. S. patent to Perry, No. 670,808....	63	1083
Exhibit No. 16—U. S. patent to Hunter, No. 690,958....	67	1087
Exhibit No. 17—U. S. Patent to de Ferranti, No. 847,-398	72	1092
Exhibit No. 18—U. S. patent to Rietzel, No. 928,701.....	78	1098
Exhibit No. 19—U. S. patent to de Ferranti, No. 1,148,-221	85	1105
Exhibit No. 20—Certified copy of British patent to Parkinson, No. 14,536 of 1894	93	1111
Exhibit No. 21—Certified copy of British patent to de Ferranti, No. 11.921 of 1903	103	1118

	Original.	Print.
Exhibit No. 22—Certified copy of British patent to Harmatta, No. 22,981 of 1903	109	1123
Exhibit No. 23—Certified copy of French patent to Egel, No. 335,889	119	1131
Exhibit No. 24—Translation of French patent to Egel, No. 335,889	125	1136
Exhibit No. 25—Certified copy of French patent to Egel, No. 336,187	129	1139
Exhibit No. 26—Translation of French patent to Egel, No. 336,187	135	1144
Exhibit No. 27—Certified copy of German patent to Benardos, No. 50,909	139	1147
Exhibit No. 28—Translation of German patent to Benardos, No. 50,909	145	1152
Exhibit No. 29—Copy of Harmatta U. S. application as filed December 3, 1903	149	1155
Exhibit No. 30—Certified copy of file-wrapper and contents of de Ferranti U. S. patent No. 1,148,221	161	1167
Exhibit No. 31—Certified copy of file-wrapper and contents of de Ferranti U. S. application serial No. 668,464	317	1321
Exhibit No. 32—Certified copy of file-wrapper and contents of Harmatta U. S. patent No. 1,046,066	349	1353

IN THE DISTRICT COURT OF THE UNITED STATES

FOR THE EASTERN DISTRICT OF MICHIGAN

SOUTHERN DIVISION

THOMSON SPOT WELDER COMPANY, Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

In Equity. No.

Before Hon. John M. Killits, District Judge for the Northern District of Ohio, sitting by designation at Detroit, Michigan.

Monday, May 19th, 1919. 10 A. M.

F. P. MCBERTY, after being duly sworn on behalf of the defendant, testified as follows:

(Mr. Church: Your Honor will understand there are quite a few defenses to be presented in this case; on this occasion we will only take testiony on the question of prior use. We have witnesses for that purpose and we will proceed at once.)

(The Court: Very well.)

Direct Examination by MR. CHURCH:

Question 1. Please state your name, age, residence and occupation.

Answer. F. P. McBerty; residence at Warren, Ohio; occupation, mechanical and electrical engineer; I am 50 years old.

Q. 2. How long have you lived at Warren, Ohio?

A. All my life.

Q. 3. You were at one time connected with the Warren Electric and Specialty Company of Warren, Ohio, were you not?

A. Yes, sir, I was.

Q. 4. How long were you connected with that company?

A. I was connected with that company from 1898 until 1906.

Q. 5. What did the Warren Electric and Specialty Comany manufacture while you were with it?

A. Incandescent lamps, transformers, desk fan motors and ceiling fan motors.

Q. 6. What was your position with that company?

A. Superintendent.

Q. 7. What types of fans were manufactured and put out by the Warren Electric and Specialty Company while you were there?

A. The fan known as the electric desk fan and ceiling fans.

Q. 8. What type of desk fan did they manufacture, or principally manufacture and put out at that time?

A. They produced a small electric desk fan of high grade quality, constructed of iron, steel and brass.

Q. 9. Of what material were the blades and guards constructed at that time?

A. At first they were made entirely of brass.

Q. 10. Was a cheaper fan ever put out by the Warren Electric and Specialty Company, while you were with them?

A. There was.

Q. 11. Generally speaking, what was there about that cheaper fan that made it cheaper?

A. We reduced the cost of production by incorporating in the construction of the blades and guards steel instead of brass formerly used.

Q. 12. About how much less was the selling price of this cheaper fan than the ordinary product?

A. That is rather difficult for me to say, on account of my not having detailed knowledge of the selling prices, but somewhere between $3 and $4 less per fan, for the small type.

Q. 13. When was this cheaper steel bladed fan of which you speak first put out by the Warren Electric and Specialty Company?

A. It was first put out in the fan season of 1901.

Q. 14. Who designed that fan?

A. I did.

Q. 15. I show you a pamphlet and ask you to state if you know what it is?

A. This is a catalog of the Warren Electric and Specialty Company's fans, which apparently was put on the market during the season in which this catalog was produced.

Q. 16. What season was that?

A. This is the 1900 catalog.

Q. 17. That catalog which is marked, I think, Defendant's Exhibit No. 1, 1900 catalog, of the Warren Electric Specialty Company, having been previously offered in this case, purports on its face to be a catalog of the Warren Electric and Specialty Company of 1900, does it not?

A. The date is not apparently on this catalog.

Q. 18. I draw your attention to the second page of this catalog, which reads in part: "It is with considerable degree of pride and satisfaction that we present for the season of 1900 three new designs of direct current motors" etc. Does that matter enable you to state what season that was?

A. That identifies it as being the catalog that was issued in the year 1900.

Q. 19. Will you please take that catalog of 1900 and referring

to one of the cuts of a fan therein, and point out the names to the Court of the various parts of the fan, in order that the Court may get an idea of the terminology used by fan makers.

A. This cage is what we call the fan guard, and encloses the blades in a sort of wire netting. You see it here. It is illustrated on page 9, rear view of the fan blades, and you will see illustrated here what we call the spider or center for supporting the fan blades on the motor shaft. You have another illustration of the same thing on page 10. Those are the narrow projections from the shaft on which the blades are fastened. Then another illustration is on page 12. It indicates the fan blades fully assembled, but not in position on the armature. The upper cut shows that.

Q. 20. Then the essential parts of the fan which you are undertaking to describe are: first, the shaft, then there is the center or spider on the shaft, and this has a number of radiating arms, and to those radiating arms are connected the fan blades. Is that correct?

A. Yes, sir.

Q. 21. Of what materials were the fan blades and spiders composed in this fan shown in the 1900 catalog?

A. These were all brass, both fan blades and centers.

Q. 22. How are the brass fan blades fastened to the centers or spiders?

A. They are riveted in position.

Q. 23. Will you explain the process that was resorted to in fastening the blades to the centers or spiders in 1900?

A. The center itself, consisting of either brass casting or built up strips, was punched or drilled, ordinarily drilled, giving certain distances between the holes, and these holes were slightly larger than the rivets to be inserted. The blades were blanked or punched out of brass sheets, and the second operation prformed on them was to punch the holes, corresponding to the holes in the center or spider. The blade was then curved to correspond to the proper shape to give the required output of wind, after which it was put in position on the center or spider, rivets put into position, the head of the rivet being placed on a small handle or block, the end projecting through the blade was turned over or spread out by a few blows of a light hammer, and finished with a rivet set, so-called, which rounded up the head.

Q. 24. Will you now explain how in the case of the brass bladed fans shown in the 1900 catalog the guard wires, were constructed?

A. The guard wires on the fan illustrated on page 5, which are of brass, are fastened into the rear or supporting ring, which is a small square brass rod or ring, by having their ends turned down to form a tenon. A hole is drilled through the ring to make a neat fit on this tenon, the wire is pushed into place to bring it against the shoulder, and the projecting end which stands a slight distance beyond the back of the ring and is smoothed over, smoothed off

with a file. The inside end of that top or guard was clamped in position back of the name plate of the brass casting, bending over small brass lugs.

Q. 25. Have you stated how the ends of the rings were fastened?

A. The ends of our rings were fastened in different ways. On square rings some of them were fastened by bringing the abutting ends together, slipping in position a metal sleeve covering this joint. Then with the aid of solder the sleeve was firmly soldered in position. That was one way. That was done both with the square and the round wires. Another method was to mill off or machine off half of the square wire for a short distance back from the end milling off on the abutting ends half on the two opposite sides, so as to make a lap. This lap when fitted was approximately the same dimension as the balance of the wire or ring. Two holes were then drilled through, a small pin or rivet put through, and finally soldered to fill up any inequalities of the joint. Another way consisted of attaching the round wires by drilling a hole in each end of the wire where they came together and inserting a small pin a short distance, which gave the proper alinement to the abutting end, and this joint was then soldered to fill it up and make it smooth.

Q. 26. How are we to understand the riveting was done so as to uniting the blades to the spider or center of the 1900 fan, by hand or machine?

A. This was by hand.

Q. 27. Coming now to the cheaper steel bladed fan, which you say was designed by you, please tell us how, if at all, it was differently put together from the brass bladed fan shown in the 1900 catalog?

A. The fan blade you are referring to or the guard. The guard, to start with, which consisted of iron rings in place of brass rings previously used, were electrically welded together at the abutting ends.

Q. 28. How were the fan blades secured to the spiders of those steel bladed fans?

A. By electric spot welds.

Q. 29. Before you began work on this steel bladed fan, what, if anything, did you know of electric welding?

A. Comparatively little.

Q. 30. State to the Court what knowledge you had acquired and where you had obtained it.

A. I had read some descriptions of butt welders, known as the Thomson butt welder, and had acquired quite a little information along the same line in conversation with one of our men employed there, or as I would say, an electrical engineer.

Q. 31. Give his name.

A. Mr. Edward B. Craft.

Q. 32. Is this Mr. Craft living?

A. He is.

Q. 33. Where is he, and what is his business?

A. The last time I saw Mr. Craft he was in the office of the Western Electric Company at New York City and my impression is he was superintendent of the new development work or in charge of the new development work, telephone work, as an electrical engineer.

Q. 34. When you first started in to construct this steel-bladed fan, how did you think you could apply the electric welding process?

A. By butt welding my guards together.

Q. 35. What steps, if any, did you take to carry out your idea of electrically welding the guard wires of the new steel-bladed fan?

A. I designed an electrical butt welder and built it or had it built.

Q. 36. Please describe generally the construction of that machine by which you did butt weld the rings or guards?

A. It consisted of two angles made of cast iron attached to each other in such a manner as to be flat or level on top, insulating material being placed between the two angles, so as to prevent the flow of current from one angle to the other, and mounted on top of this two small swinging arms; these arms being arranged to move through a short portion of an arc, and drilled a cap to enable attaching copper electrodes or plates to their upper sides; these electrodes or plates being arranged to clamp the wires which constituted the fan guard ring. There were put in position on top of these movable plates or arms, pins which engaged cam levers to enable us to clamp the metal pieces firmly in position during the welding operation. There was also supplied with this equipment an electric transformer, designed to give a comparatively low voltage, and heavy amperage, which is necessary in making electric welds.

Q. 37. How were the ends of the steel wires constituting the guards brought together?

A. The wires were ordinarily bent over in the shape of a ring, so that the ends would come together with some slight amount of pressure. That is, they were formed a trifle smaller than the circle would be when completed. By placing these ends into the clamp with the abutting ends meeting between the two movable parts, or the two sets of copper electrodes, and clamping them firmly with the cam levers, then taking hold of the lower set of cam levers, turning them slightly, you applied pressure which forced the ends of the wires together.

Q. 38. Upon what did this lower set of cam levers impinge in order to give that result?

A. Upon the movable plates which carried the electrodes and clamps.

Q. 39. You were present this morning, were you not, when Mr. Gravell operated a butt welding machine here in Detroit for the information of the Court?

A. I was.

Q. 40. How did the operation of that machine that you constructed in 1901 for butt welding the fan guards correspond to that operation which you saw this morning of butt welding?

A. Practically the same.

Q. 41. What success did you have in electrically welding the ends of the steel guard wires in this steel bladed fan in 1901?

A. I had perfect success.

Q. 42. It was a satisfactory operation?

A. Entirely so.

Q. 43. Did you test the joints for strength, and if so, how did you do it?

A. We tested the joints for strength by bending them back and forth, by hammering them out straight, making short bends in them.

Q. 44. Did you find the joints strong and serviceable?

A. The majority of the work was as strong at the welded point as it was anywhere else in the body of the stock.

Q. 45. And after you had successfully welded the ends of the guard wires on this steel-bladed fan, how came you to arrive at the conclusion you could also weld the fan blades and spiders?

A. That was the result of an effort on my part to electrically weld copper wire of a reasonable cross section, approximately the same cross section as the guard wires.

Q. 46. A little louder. What was your answer?

A. That was the result of an effort to electrically weld copper wires which were of approximately the same cross section, or diameter, as the guard wires were.

Q. 47. You mean to butt weld them?

A. Yes, sir.

Q. 48. You may go on with your illustration.

A. When I tried this operation, I was not successful in making a weld; I did not seem to get the heat necessary to fuse the projecting ends. This led me to believe I did not have sufficient resistance at the point of contact between the abutting ends of the copper wire, but I did know that this resistance was generated by heat on the iron wires; to get, therefore, practically the same effect on the two copper wires, as I did get on the two iron wires, I put pieces of sheet steel, small pieces of sheet steel, between the abutting ends of the copper wire; the copper wires were clamped in position in the jaws; small pieces of steel placed between the abutting ends; pressure applied, with the aid of the lower clamp to move the swinging plates toward each other, and turn on the current, and while I generated heat, apparently lots of it, I did not weld my copper wires, but I did weld my two steel plates.

Q. 49. How did you expect to weld the two copper wires with the steel plates interposed between them?

A. My impression was that the resistance of the steel plates would generate sufficient heat which would be communicated to the copper wires to bring them up to the fusing point, and the pres-

sure applied would force out the steel plates which would melt up, and I would have a weld.

Q. 50. You mean you expected the copper wires would pass through the steel plate after a proper degree of heat?

A. Yes, sir, after a proper degree of heat, or they would burn up or melt out the steel plates.

Q. 51. So that the ends of the copper wires would come in contact?

A. Yes, sir, the ends of the copper wires would come in contact.

Q. 52. And be sufficiently heated to weld?

A. Yes, sir.

Q. 53. Tell us again what the result of that trial was?

A. The steel plates came up to a welding heat on their two meeting surfaces, but my copper electrodes did not come up to a welding heat, when I cut the current off. Since that experiment was not successful, I found I had made a perfect weld between the two steel plates.

Q. 54. Now, how did you utilize that discovery, if at all?

A. After repeated experiments, or repeated demonstrations of the process to enable me to get a good idea of the strength of a union of that kind, it appeared to me that could be used to replace or to take the place of the rivets in the steel blade guards or centers.

Q. 55. In making these experiments on what you have referred to as plates, what was the thickness of the material?

A. The steel plates were about .035 thick, possibly more, may have been less. I did not ordinarily micrometer the stock, and the centers—

Q. 56 (interrupting). No, I am speaking now of the experiment you made before you began to do anything with the centers.

A. That is what we called our fan blade stock, just a trifle more than 1/32 thick.

(The Court: Of the same material of which you made the steel fan blades?)

A. The same material.

Q. 57. (By Mr. Church). Now, you may go on and state what, if anything, you did in the way of making practical application of the discovery you made in your experiments?

A. I welded up a number of steel fan blades to steel centers.

Q. 58. What modification or addition, if any, to the welding machine that you had there and had used to weld steel guard wires was made to enable you to weld the fan blades to the spiders or centers?

A. I introduced into the machine electrodes of copper points which were clamped in position that the guard wires originally were clamped.

Q. 59. You mean you substituted them for the steel wires in those places?

A. Yes, Sir.

Q. 60. Then what did you do?

A. I pointed the ends slightly to concentrate the heat at the point of contact. These constituted our electrodes, as we call them now.

Recess to 1:30 P. M. same day.

AFTERNOON SESSION.

The Court convened pursuant to recess.

F. P. McBERTY resumed the stand, and his direct examination was continued as follows.

Examined by MR. CHURCH:

Q. 61. During the noon recess, you stated to me that you had made an error in regard to your employment.

A. Yes, sir.

Q. 62. If you desire to correct anything, will you please do so?

A. I made the statement I had been employed by the Warren Electric and Specialty Company until the time I left that place in 1906. I was employed by the Warren Electric and Specialty Company until the Peerless was organized, and then I was employed by the Peerless, and discontinued my connection with the Warren Company, and that was in 1902.

Q. 63. So that up to 1902, you were employed by the Warren Electric and Specialty Company, and thereafter by the Peerless Company; is that correct?

A. That is correct.

Q. 64. Is that original welding machine that you used to weld the ends of the steel guard wires and the blades and spiders of the steel-bladed fan still in existence? If so, please state where it is at this moment.

A. It is in existence at the plant of the Henry Ford Motor Company, Detroit.

Q. 65. Is it accessible, so that the Court can view it, if, later on, he takes a recess for that purpose?

A. It is, and ready for operation.

Q. 66. Please examine the photographs I now show you, marked respectively Defendant's Exhibits C and D, and Defendant's Exhibit E, offered in connection with the deposition of defendant's witness, Captain W. E. Smith, and state, if you know, what they represent?

A. Exhibit E represents the front view of the transformer or welding machine.

(The Court: The one of which we have been talking?)

(Mr. Church: Yes, Your Honor.)

(The Witness: That is correct.)

Q. 67. Exhibit C?

A. Exhibit C is the top view or plan view of the welder as it appears at present; it shows the welder with the pair of electrodes in position, and the fan between the electrodes. Exhibit D is another view, practically the same thing, giving the same detailed view of the entire machine; the blades are shown between the electrodes and the transformer and the support. I will say here that is not the original frame upon which this welding machine was attached.

(The Court The wooden part?)

(The Witness: The wooden part. It was of the same general shape when we used it in 1900 and 1901.)

Q. 68. (By Mr. Church) What was the machine attached to in 1901?

A. It was attached directly to a heavy bench, which was used for the manufacture of fan guards.

Q. 69. Where was that?

A. That was on the second floor of the fan motor department of the Warren Electric and Specialty Company.

Q. 70. Please examine this additional photograph I show you, and state, if you know, what that represents?

A. This represents the top or plan view of the same machine, with conductors conducting the current through the welding clamp, the jaws disconnected to illustrate how these lower jaws were attached when the machine was used for welding.

(Mr. Church: Defendant offers in evidence the photograph last shown the witness, and requests the same be marked Defendant's Exhibit G.)

Q. 71. When and for what purpose were these photographs, that you have referred to, taken?

A. These were taken in 1917 to illustrate the general design of the machine and to give a fair idea what the position of the machine was as we operated it in 1901.

Q. 72. Utilizing these photographs, please point out the various parts of the machine shown in them, and then explain how the machine was operated to weld the steel blades, and centers about which you have been testifying.

A. Well, on Exhibit C the machine is shown with a front or

plan view. The electrodes which carry the requisite amperage and low voltage to the welding jaws are shown, and this illustration here shows the copper electrodes in position and also a fan blade and center in position, and one arm of the spider is shown. These are copper jaws and they are so made to promote movement here. These are copper jaws here, and these are copper conductors, leading from the transformers; and short copper rods to form the electrodes; these copper rods are pointed to concentrate the energy on a comparatively small area. Exhibit D is practically the same thing, only it shows the operator's hands in position when they are welding blades to the fan. In Exhibit G you have here in the first place the angle shaped pieces which constitute the bed plate of the machine. Here is the insulation which is put in to keep the currents apart. These parts illustrate the metal plates which carry the copper electrodes. This is one of the copper electrodes and this is the other. These are movable electrodes in both cases. These two top cams here are so designed as to force the copper electrodes against the wire which is inserted between the jaws here; they are copper electrodes for spot welding the wire or iron for butt welding. And these cams, lower cams, slightly shorter, are designed in the same way, so that by rotating around the pins, they force these two movable sections together. Now, the only difference between this machine and the butt welder we saw this morning is the one we saw this morning is adapted to move in a straight line, and this is an arc, but comparatively little, not more than ¼ of an inch all told. But when you turn these handles around, that forces these pieces together with considerable force, and these pieces here, which are copper, constitute the main conductors, giving here a good contact on these copper points, permitting the current to flow from this point across the abutting electrode here, completing the circuit, and generating the heat at the point of contact.

Q. 73. At the expense of repetition, I wish you would tell the Court precisely how you proceeded with this machine to weld the guard wires, for the moment leaving out of consideration the blades.

A. I will place that so you are the operator. (Referring to photograph Exhibit G) You are the operator. The guard wire is laid on here; these rings are approximately 17⅞ inches in diameter, so that they lead around back of this bench, just clearing the bench; they are dropped in position. These handles are out here this way, giving room to drop the ring in position. With the device for welding round rods, this is slightly curved, to correspond to the curve of the ring. This is dropped in position with the ends together, although with not much pressure. The upper clamps are brought directly towards the operator, which forces with pressure, forces the copper point firmly against that piece. That is the main electrode. With the die lug in position, you then turn the lower clamps which operate the swinging supports. This

forces the ends together. Then the operator presses down his foot switch which is shown on Exhibit D. This has not been mentioned before, but it was the device for turning the current on the transformer when they are ready to weld. This foot switch device is necessary in this particular type for the operator has to use both hands in controlling the pressure. When his ends are firmly clamped, he presses down this foot switch, which causes the current to flow. It is an alternating current and flows through these electrodes, the point of contact being defective, the contact generates the heat at that point, which brings it up to a welding point. As soon as it gets to the welding point, which is judged of by the operator, he forces the ends of the lower cams together; the metal flows or squeezes together, and the weld is completed. He cuts off the current, the upper cams release the ring and slip it out and the weld is completed.

Q. 74. Will you please, in like manner, go through the process of welding those blades to the spider taking care in your description to refer to the parts in a way which will show which part you are referring to.

A. In welding the blades to the spider, you will again consider yourself the operator. We place our copper electrodes in the same identical position that we did our guard rings with the ends a slight distance apart.

(The Court: You supplement the original copper electrodes with pieces, which changes the method of application?)

The Witness: The copper electrodes merely change the method of application of the current; that is all. In other words, it takes the place of copper points for butt welding. With these copper electrodes, or welding points, as we call them, now in position, we clamp them firmly with the aid of the upper two cams and turn the lower cams or pressure cams back towards the operator, permitting the jaws to spread apart, as they are adjustable, and we then hold our fan blades in the center and in the proper relative position to each other, slipping them down on those two points, copper electrodes; holding that with one hand, we turn one lever out, which brings this electrode back; we then turn our second lower lever out, which brings the contact or electrode firmly against the blade on one side, and to the center on the other. When we have secured contact there, we again apply pressure to the foot switch, which causes the current to flow, and the current flows through these pointed electrodes, through the two pieces of sheet steel or fan center and the fan blade to the opposing electrode, and the metal, the steel, which is of greater resistance and a poorer conductor, generates sufficient heat to bring it up to the welding point. When the operator has the proper temperature, which is judged by the eye, he presses this

down, releases this lever, which permits the jaws to swing or spread apart, and your weld is completed. You repeat the operation for each individual weld.

Q. 75. Will you please examine the set of fan blades I now show you and state what it represents and when it was made.

A. This represents the steel fan center and four steel blades of the standard type, which is manufactured at the present time by the Peerless Electric Company, as far as the center is concerned, but not the blades. They have discontinued manufacturing this form of blade in this shop. This fan blade was welded to this center the latter part of last week by myself.

Q. 76. On what machine?

A. On the old original welder, manufactured in 1901.

Q. 77. You do not claim then this particular set of fan blades and spider was manufactured at an early date?

A. Oh, no, but simply for the purpose of illustration in this case, although it is a very fair representation of the product at this time.

Q. 78. State whether or not this was welded by the machine as shown in the photograph?

A. This was welded on the machine represented in the photograph, which we built in 1901 in the Warren Electric & Specialty Company's shop.

(Mr. Church: The fan blade and spider produced by the witness is offered in evidence as Defendant's Exhibit H.)

Q. 79. In the use of this original machine of yours in 1901, at how many points was each steel blade welded to its respective steel spider?

A. In three points on each blade.

Q. 80. State whether or not the places or spots at which the blades and spider arm are welded together were surrounded by unwelded portions or metal parts?

A. They were.

Q. 81. How far apart were these welds, and how far from the edges of the blades and spider?

A. Without measuring, it would be difficult to say, but the spot welds were placed in the center of the blades, and in the center of the spider, the points of contact, as nearly as we could get it with the eye.

Q. 82. How far was that from the edges?

A. I should say at least one-eighth of an inch at the narrowest point.

Q. 83. State whether or not the welds that united the blades and spider arms answered the purpose of rivets?

A. They did in every respect.

Q. 84. What have you to say as to the strength of the union between the blades and spider arms at the places or spots of welding? Of course, we are now referring to 1901.

A. I would say the strength was much greater than the rivets; in other words, it would tear out a piece of metal before the weld would let go.

Q. 85. Did you, in 1901, make any tests to determine the strength of the welds, and, if so, what did you do, and what was the result?

A. I did that repeatedly, and in these tests we would either destroy the blade, destroy the center, or both, and very seldom the welds did not tear out the sheet metal, rather than let go between the two contacting places.

Q. 86. State whether or not these tests were satisfactory to you, indicating the good character of the welded union between the blades and spider arms on these steel-bladed fans?

A. These tests were entirely satisfactory, as far as any one had observed them at the time.

Q. 87. Now, Mr. McBerty, state whether or not any of these steel-bladed fans were made up by you for the market in 1901?

A. There were, quite a few of them.

Q. 88. What do you mean by quite a few; that is very indefinite?

A. When I say quite a few, I mean there were 15 or 16 all told of the one type, spot welded. We sent these fan blades through the factory in trays which were arranged to hold a certain specified number of blades, and one tray of these went through the course of manufacture.

(The Court: Were they put into commercial use?)

A. Yes, sir.

Q. 89. Will you please state just how the steel-bladed fans were tested and prepared for the market?

A. I think I can better illustrate that by taking this blade here, if that is satisfactory (referring to Defendant's Exhibit H). This steel center is put in position of the blades and clamped there with electrodes—well, in three points—after the blades are assembled on the center, they are sent to the manufacturing or machining department and are mounted on steel hubs which has a small projection or collar, this hub being bored to fit the armature shaft of the fan. It is then mounted in a punch press, which firmly punches the steel center attached to this steel hub. It then goes back to the operator, who takes the steel blade mounted on his steel hub and slips it on a mandrel which is ground true, and sets it on a device arranged to rotate the whole in proper position. He rotates that between two adjusting points or distance points, the idea being to cause this corner to touch one distance point and then touch the other, which gives what we call the pitch of the blade. The four blades are supposed to turn in the same circle, being practically the same distance from a given straight line. After the proper pitch is put in the blades, it goes to a second operator, who puts it on another mandrel and is laid on what we call the balancing machine,

this mandrel being six or eight inches in length. They are permitted to rotate until this heavy material is balanced, and it is then clamped and allowed to rotate and adjusted until this blade can be set at any point and it will stand stationary and then the balance is completed. The blade then has the proper pitch, has the proper balance, and it is completed as far as the operation is now concerned. It is then put into the painting or japanning department, where it receives a coat of japan, one or three coats, whatever they wish to put on. After it has been properly japanned, it is returned to our stock room, that is where all the various parts meet in the factory. It comes back in the tray which holds a number of them, and stays there until the tester or inspector calls for it. He ordinarily takes these blades out and mounts them on a fan or sets them on what he calls the testing block and turns the current on at various speeds to see whether they run smoothly. If properly balanced, it runs smooth and makes no noise. If found perfect, he turns them over to the shipping department.

Q. 90. State whether or not the process of testing which you have elaborated was used in the testing of that batch of blades and fans made in 1901, about which you have testified?

A. This process was applied to the regular spot welded blades and went through identically as it was with the riveted blades; they went through the same course of handling and finally was disposed of in the same way as riveted blades were disposed of, went out as the regularly manufactured article.

Q. 91. State whether or not the production of the steel-bladed, spot-welded fans of 1901 was regarded as a realization of the direction given you to produce a cheap or moderately cheap fan?

A. That was regarded as a development along the line suggested, that we produce a fan that was as much cheaper than our regular or high grade fan as could possibly be made. It eliminated punching, and eliminated the use of rivets.

Q. 92. State what, if anything, was done in the way of offering these steel-bladed, spot-welded fans on the market in 1901?

A. The most striking point was that our sample fan which is always one of the first of a given type that is brought out, was equipped with spot-welded blades and photographed, and cuts were made for the catalog from that photograph, and illustrated in our regular catalog covering that year's production of these spot-welded blades. One of the first we produced was so used on the small fan, the fan was photographed, the cut was made, and the fan blade was advertised, or the fan was advertised complete with that type of blade.

Q. 93. I show you a pamphlet and ask you to state what it represents, and when you first saw it, or one like it.

A. This represents the Warren Electric & Specialty Company's fan catalog of the season of 1901, and I cannot exactly identify the date it was put out, or when I first saw it, but it was some time along—that is as I first saw it with reference to this particular fan,

but this particular catalog was brought to my attention in 1917 at the office of the Peerless Electric Company at Warren, Ohio.

Q. 94. Can you point out in this catalog of 1901 any cut or description identifying the steel-bladed, spot-welded fan of 1901, about which you have been testifying? If so, please do so and show it to the Court.

A. I can. This 1901 type of fan was classified as all our fans were classified by a letter to indicate the type of fan it was. Our high grade fan originally started out by being classified as Type A. Later, we developed what is known as a cast iron fan, which was designated as Type E, and this type here was designated as Type G, and we have a cut of the Type G fan indicated here as the G-2 on page 17 of this 1901 catalog.

Q. 95. Please examine the various cuts of fans shown in the 1901 catalog and tell the Court if you find anything indicating how the fan blades and spider arms of those fans were united?

A. On the G-1 fan you will note by looking carefully there are rivets in that blade, and on the E-4 you can see the rivets. On E-3 you can see the rivets. On G-2 you do not see any rivets.

Q. 96. From what, if you know, were those cuts made?

A. Those are taken directly from photographs of the particular fans produced for any given season.

Q. 97. Why do you not find any rivets on fan lettered G-2?

A. Fan G-2 is an illustration of the fan that was produced by the spot-welded blades, and consequently no rivets shown.

Q. 98. Do all the other fans in that catalog show rivets?

A. Every other fan in the catalog shows rivets.

Q. 99. Do you find any descriptive text in this 1901 catalog, indicating how the blades of any of those fans were secured?

A. Referring to our Type A, direct current desk fan, on page 8, under the paragraph headed "Blades":

> "Blades are of best quality of heavy spring brass, firmly riveted to solid cast brass center, with hub of ample length to insure firm bearing on shaft. Every blade is carefully adjusted and balanced to run at a high rate of speed without vibration."

That refers to the Type "A" fan, the best grade of fan produced at that time. On Type "E" fan they do not go into details so much, but they do say that:

> "Type 'E' fan is of extra strong mechanical construction, and its use is recommended where hard usage and little attention are inevitable. Body of fan is heavily enameled in black, hand polished and striped with gold All brass parts are highly polished and lacquered.
>
> "General construction of blades, guard, armature, commutator, bearings, oiling device and regulating device is the

same as in Type A fans. Brush holders are of the cartridge type and easily removed.

"We recommend this fan to those desiring a universally adjustable fan."

On page 17, under the heading "Type 'G' Direct Current Desk Fans," it says:

"Types (G-1) and (G-2) are rigid iron clad fans of symmetrical design and strong mechanical construction. The finish throughout is plain black enamel. This fan develops a large wind output, but is less efficient than Types A or E, illustrated on preceding pages. We recommend this fan to those with whom efficiency is a secondary consideration, but who desire a strongly built, serviceable fan at low first cost. This fan operates at one speed only."

Q. 100. In what respects would you say those G-2 fans illustrated in the catalog were of cheaper grade than the other fans?

A. They were constructed with as little finish as we could possibly get away with; the idea being to cut the finish, which is one of the expensive operations in producing fans. The result was we assembled them and gave them a dip of black japan, simply applying the japan to the body. We put no gold stripe on, and finally we cut out the resistance or speed variation device, making it merely a one-speed, and turning the switch on you have the full current, full speed.

Q. 101. How as to qualities of adjustability?

A. It had no adjustments to permit rotating on the base, or any device to permit it to be tilted forward or back, all these extra operations being eliminated.

Q. 102. What was the material of the blades and spiders of that type of G-2 fan?

A. The blades and spiders were of iron or steel, rolled steel.

Q. 103. How many of those fans of the G-2 type illustrated in the 1901 catalog do you understand were actually made?

A. Referring to the G-2 fans or blades, there were 15 or 16 of that type of blade gotten out.

Q. 104. And that was when, what year?

A. That was in the early spring of 1901.

Q. 105. Do you know what became of those fans of the type shown in the cut G-2 of the catalog of 1901?

A. I do not know what became of them, further than the fact they were taken from the stock room and assembled on the fan and went through with the fan wherever it was shipped.

Q. 106. You have stated that a quantity of these steel-bladed, electrically spot-welded fans were made up and sold as the regular product during the fan season of 1901. When were the fans disposed of that were constructed like this G-2 fan you have testified about?

A. They were disposed of during the fan season of 1901 and 1902. I am not in position to say definitely in which year those parts went forward with the fans. They went with the stock, or possibly on a direct order.

(Mr. Stackpole: How can he testify to anything of that sort? I would like to have him confine himself to what he knows himself.)

(The Court: This last statement was speculation, of course.)

(Mr. Church: Very well.)

Q. 107. Why, if you know, were not more of this type of fan with the spot-welded blades and spiders put out?

A. That was a matter that was discussed between D. W. Gilmer, the general manager of the Warren Electric & Specialty Company; Mr. Jasper Powers, the production man, or machine shop superintendent, of the Warren Electric & Specialty Company, and myself. We had to get out a certain number of fans in a given time. We got our sample fan completed, and the matter of spot welding the blades was taken up with Mr. Gilmer and with Mr. Powers, Powers being the mechanical man, having in charge the production of the metal parts of the fan, and he rather insisted that we stick to the older method of riveting, due to the fact he had the punches made for punching his centers, and punching his blades. He had operators skilled in putting these blades in positon, and could go through all the regular processes without any interference at all, it was standard, whereas, if they had to be spot welded, it meant an electric welding machine with capacity enough to take care of our current for welding both the blades and spiders and required considerable time, particularly if we got what we call a hot season, and be compelled to produce a lot of fans, and again, he would have to purchase jigs for holding the blades in position, and also another welding machine, to give us capacity to take care of the product. All those would involve an outlay of considerable money, which was quite an object with us, and the delay, due to the production of the additional machine jigs, and furthermore, it would compel us to carry a line of fan blades which were punched ready for the brass rivets, a line of centers already punched and a line of blades not punched, and a line of centers not punched, thus compelling us to carry duplicate stock, which we always avoid if we can. The final result was they overruled my spot-welding idea, sticking to the riveting for that season, with the definite understanding if anybody wanted spot-welded blades we would be in a position to weld them.

(Mr. Stackpole: What was the definite or indefinite understanding is not competent.)

(The Witness: That was definite.)

Q. 108. Notwithstanding this determination of the superintendent, Mr. Gilmer, not to stock up with the steel fan blades for this G-2 fan, did the Warren Electric & Specialty Company still continue to advertise them and offer them for sale?

A. They did.

Q. 109. I show you a catalog and ask you to state what it is and when it was put out, and by what concern it was put out.

A. This is the Warren Electric & Specialty Company, or Peerless Direct Current Fans for the season of 1902, and I might remark right here that we issued one catalog per year, and this was brought out sufficiently early to get it in the hands of the jobbers before the fan season started.

Q. 110. Will you point out to the Court, if you can, any illustrations in that catalog of this steel-bladed, spot-welded fan?

A. This same steel-bladed, spot-welded fan is illustrated on page 11 of the 1902 catalog.

(The Court: That is exactly the same illustration as in the 1901 catalog?)

A. Exactly the same; we offered the same type of fan, as far as the illustration is concerned.

Q. 111. Do you find anything in this 1902 catalog indicating the method by which the blades of that G-2 fan were applied?

A. No, there is nothing said in reference to it directly, but the illustration shows a blade without rivets.

Q. 112. How are the other fans illustrated in that 1902 catalog shown as to method of attaching the blades to the spiders?

A. Every other fan shown in this catalog has riveted blades, and the rivets distinctly show.

Q. 113. Is there anything in the text of that 1902 catalog relative to G-2 type of fan that is different from the text or description found in the 1901 catalog? If so, please point it out to the Court.

A. There is a slight change in the description of this G type of fan, and that is due to the finishing. Our first season's output of fans did not sell as readily as we anticipated.

Q. 114. You mean 1901?

A. Yes, sir. It says:

> "Types G-1 and G-2 are similar to types E-1 and E-2, except they are not adjustable and no attempt at ornamentation has been made on this fan, the finish being black without striping for base and body, and with nickel plated guard and blades. It has three speeds and is strong and well built and perfect electrically."

Instead of supplying a black japan finish over the entire fan,

they have changed the finish from black japan to nickel plate, as far as the guards and the blades are concerned, and they added these variations on the standard of the other fan.

Q. 115. In the fan of that 1902 catalog, is there anything indicating how in the case of the fan that employed brass blades and brass guards the guard rings were united?

A. The guard rings were not butt welded.

Q. 116. Refer to the catalog and see if any reference is made to them.

A. The brass guard rings are not illustrated as being butt welded at any time, because we could not butt weld them.

Q. 117. How are they illustrated as being connected or fastened?

A. On the front ring of the G-2 fan you will note a sleeve put in position there. That is one method of fastening the rear ring. This one here is comparatively thin. The same thing applies to the other guard as far as the brass finish is concerned.

Q. 118. Referring to the G-2 fan shown in that catalog of 1902, is there anything indicating how the guard wires were fastened?

A. There are no marks of any kind indicating how they are fastened. They are practically a complete circle, no joint, which is due to the electric welding process.

Q. 119. Is that true of the type shown in the 1901 catalog?

A. That is identical with the 1901 catalog.

(Mr. Church: I offer the 1902 catalog in evidence, to be Marked Defendant's Exhibit I, 1902 catalog.)

(The Court: Have you put in the 1901 catalog?)

(Mr. Church: That was put in in the deposition of Captain Smith.)

Q. 120. Evidence has already been offered in this case to the effect that in 1902 the Warren Electric & Specialty Company sold its fan department to the Peerless Electric Company of Warren, Ohio, and that the latter company carried on the former company's fan business under a new name. Please examine the pamphlet I now show you and state if you know what it is.

A. This pamphlet handed to me is the Peerless Electric Company's fan catalog for the year 1903.

Q. 121. What is the marking on the inside of the first page?

A. It says "Plaintiff's Exhibit No. A."

(Mr. Church: I offer that catalog in evidence as Defendant's Exhibit No. J, Peerless catalog 1903.)

Q. 122. Do you find a G fan illustrated in this 1903 catalog? If so, state how it compares with the G-2 fan of the catalogs of 1901 and 1902.

A. I do find on page 5 of the catalog the G-2 fan, and it does not compare with the G-2 fan of the 1901 and 1902 catalogs.

Q. 123. What is the difference?

A. This G-2 fan illustrated here has riveted blades; it has the support for the fan body known as the trunnion, and also has what we call the swivel base, and the three-speed arrangement in the base of the fan.

Q. 124. How about the blades?

A. The blades are shown as riveted in position.

Q. 125. What does that indicate to you as to the method by which the fan is put together?

A. This fan is riveted in the same manner as the regular fans were, that is, the same manner as our high grade fans were. These metal blades are riveted to the metal center.

Q. 126. Do you find in that 1903 catalog any illustration of a fan in which the fan blades are not riveted; plainly indicated as such?

A. No, there is no fan illustrated in this 1903 catalog that does not show distinctly rivets.

Q. 127. Is there any illustration in that 1903 catalog of steel-bladed, spot-welded fans?

A. The spot-welded, no; the steel blades, but not spot-welded, riveted.

Q. 128. Am I right in saying that the 1901, 1902 and 1903 catalogs all show and describe brass bladed fans as riveted, while the 1901 and 1902 catalogs show steel bladed fans with no indication that they were riveted?

A. You are right in that statement. It particularly mentions the fact on page 2 that the direct current desk fans, the blades are firmly riveted to their centers.

Q. 129. I show you another pamphlet and ask you to state, if you know, what it is, and by whom it was put out?

A. This also is a Peerless Electric Company's fan catalog for the year 1904.

Q. 130. Is there any steel-bladed, spot-welded fan illustrated in that catalog?

A. There is not.

Q. 131. How are the fan blades of the fans illustrated as connected to their spiders in that catalog of 1904?

A. Every illustration in this catalog of the desk fans shows rivets in the blades.

Q. 132. Have you in your possession or under your control any of those steel-bladed, spot-welded fans that were made in 1901, put out on the market, as you have testified?

A. We have not. I have not.

Q. 133. Have you made any effort to locate any of those fans, and if so, state with what success.

A. I have made an effort to pay if we could locate any of the

spot welded fan blades produced in 1901, and we haven't been successful in locating any.

Q. 134. State a little more specifically what has been done to locate one of those fans, giving the Court an idea of how diligently you have been trying to find one.

A. Mr. William E. Smith, Captain Smith, made quite an extended search personally among the repair shops and jobbers in the East at all points we could suggest that he might be successful in picking up a fan of this kind that had been sent in for repairs or returned for any reason whatever, but he was not successful, although he spent several weeks in this investigation. Mr. Barthel of Detroit also endeavored to find a fan of this type and has traveled around and called on a number of dealers, jobbers and repair men to see if he could secure anything of the kind.

Q. 135. Please examine the paper I show you and state if you know what it is and at whose instance it was printed.

A. At the request of Mr. Church, we issued a circular, giving an illustration of the fan illustrated in this 1901 catalog and circulated the circular, offering a reward for the production of a fan of this type with the spot welded blades.

Q. 136. What steps were taken to secure circulation of this particular circular amongst those most likely to have one in their possession?

A. We sent out quite a number of those circulars or bulletins; we took what is known as the Electrical Record, which is a periodical published in New York City by the Gates Publishing Company, No. 367, known as the list of buyers, this list being published by the Gates Publishing Company, giving the names of buyers, of firms buying electrical goods. We selected from that list names of firms that we were confident were located in the territories in which these fans would ordinarily be sent, and we sent to 207 different firms these circulars, copies of these circulars, with the idea that if there was anything of the type that was advertised, some of these various firms would possibly have one, and that we would pay for this particular form $250—if they would send us one of those blades or one of those fans, but we haven't yet had a single answer.

Q. 137. Do I understand these people to whom you sent this circular were dealers and repair men?

A. They were dealers and repair men, our idea being that the fans would eventually come to the repair men, because fans in the course of two or three years will be returned to be smoothed up or oiled up or refinished.

(Mr. Church: One of the circulars referred to by the witness is offered in evidence as Defendant's Exhibit K, Advertising Circular.)

Q. 138. Will you state the result of these advertisements or the circulation of these circulars?

A. We were not successful in locating anything at all in the line of a spot-welded fan. In connection with this circular, you will note it says: "The Peerless Electric Company of Warren, Ohio, stand ready to pay," etc., the idea being to interest the dealers that were doing business with the Peerless Electric Company who still produced fans, and while we sent them out from the office of the Peerless Company, the reply was to be returned to the Warren Electric and Specialty Company.

Q. 139. Returning now to the electric welding machine built by you in 1901, please state who did the work on that machine?

A. The welding machine was constructed by Jasper Powers, the machine shop superintendent of the Warren Electric & Specialty Company, that is, the welding machine proper.

Q. 140. Where was the transformer that was used in connection with that machine obtained?

A. The transformer that was used in connection with that butt welding machine was obtained from the store room of the Warren Electric & Specialty Company.

Q. 141. Can you give us the history of that transformer?

A. In the spring of 1900 a firm known as the Pneumatic Wheel Company of Freehold, N. J., wrote to the Warren Electric & Specialty Company for a quotation on a welding transformer, or transformer with the proper voltage for the welding of metal rings, and this transformer was produced and shipped to them and tested out by them, but was not of sufficient capacity to preform the work for which they had purchased it. It was later on returned to the plant of the Warren Electric & Specialty Company for exchange for a much larger transformer for the identical service, and the transformer in question being in stock in the transformer department, was later on turned over to the fan motor department to operate in connection with this welding machine that we produced. I will say that appears in the deposition of Captain Smith, so it is unnecessary to pursue that further here.

Q. 142. Where was the electric power obtained from that was utilized in welding in this 1901 machine?

A. We generated our own power, the Warren Electric & Specialty Company.

Q. 143. Do you recall any one who saw you engage in spot welding on this spot welding machine in 1901?

A. That is a little difficult for me to say, whether they saw me do this identical work or not. Mr. William E. Smith, known as Captain Smith, has seen me spot weld. Mr. McDonald, known at that time as our motor tester, and Mr. E. B. Craft saw me do spot welding, whether he saw me weld these particular blades in position or not. And others saw me do spot welding. There was no secret made of this process.

Q. 144. Where was this work done? Describe to the Court where you were and where you actually spot welded these fans.

A. It was done in the fan motor department on one of the benches

used in assembling the fans, on the second floor of the fan motor building of the Warren Electric & Specialty Company.

Q. 145. Did any one else besides you, to your knowledge, use this spot welding machine for spot welding in 1901?

A. Captain William E. Smith has done spot welding on it.

Q. 146. About when?

A. About the same time I did this one.

Q. 147. What year?

A. The spring of 1901.

Q. 148. Anybody else, to your knowledge?

A. I would not want to say definitely on that as to who else.

Q. 149. Have you preserved any specimen of spot welding done on that machine in 1901?

A. I have.

(Mr. Church: Mr. Stackpole, have you in your possession the specimen of Mr. McBerty's spot welding work——)

(Mr. Stackpole: I am not sure. Mr. Church has asked us to produce a specimen said to have been made in 1901 by these people which we have in our possession. It is attached to an affidavit that we shall have occasion to use and will be used, no question about that, but we see no reason for producing it at the present time.)

(Mr. Church: I think we ought to see it now.)

(Mr. Stackpole: I should not like to detach it from the affidavit, because it is pretty important.)

(Mr. Church: I do not want to see your affidavit. You may seal up your affidavit.)

(Mr. Fish: He has not indicated whether he has any other samples or not, and it seems to me this might be postponed until we see whether that is the only alleged relic.)

(The Court: You can find that out by a question or two.)

(Mr. Fish: I think he ought to develop that more clearly.)

Q. 150. Mr. McBerty, will you please describe the specimen of the spot welding which you believe to be in the possession of the plaintiff in this case, so that we may call for it more definitely?

A. The section of the blade that the Thomson Company should have should be a section of a blade and a part of a center cut through diagonally, which should correspond to the other blade and center; they have one half and we have the other half.

(Mr. Stackpole: Let us see the half they have.)

(Mr. Church: Is there any reason why we should not have those?)

(Mr. Stackpole: It is a part of the cross-examination that would be more effective if we do not give it up to the witness.)

(The Court: You want to use it for cross-examination?)

(Mr. Fish: Surely. I should have said one word in the opening which I did not say to prepare your Honor for this issue. This patent has been sustained by the Circuit Court of Appeals of the First Circuit in a contested case after a long hard hearing. Mr. McBerty was a witness in that case. In the preparation of the defense in that case, as far back as 1913, this whole proposition was thoroughly investigated by Edwards, Sager & Wooster of New York, who were counsel for the defendant.)

(Mr. Church: If this is testimony, perhaps he should take the stand.)

(Mr. Fish: No, it is nothing in the nature of testimony; it is a fact. They got full affidavits from Mr. McBerty and all the rest of these people and never used them in the slightest degree although the trial was not for a year or so after that. When the case was finally decided by the First Circuit, the real defendant who had got these affidavits, came in and settled up; and we have those affidavits and propose to produce them. It would interfere directly with our cross-examination to have it produced at the present moment, and I also suggest, may it please the Court, that it does not come in here properly at this time; let us see what else they have got; if they can produce anything else from their scrap heap that is in this line, let us have it. We have two or three things attached to these affidavits and even to show them now in connection with the direct examination, of course, would interfere decidedly with our cross-examination. It is a very different story that is told in them.)

(The Court: You wish to cross-examine on this affidavit and confront him with that affidavit?)

(Mr. Fish: Exactly, your Honor.)

(The Court: And you propose to produce the specimen?)

(Mr. Stackpole: Absolutely, your Honor.)

(Mr. Fish: We want this whole story, but the version of 1913 we would like to have coupled with the version of 1919.)

(The Court: Have you the affidavit of this witness attached to that specimen?)

(Mr. Stackpole: Certainly we have, your Honor, and we have a certain specimen——)

(Mr. Fish: Attached to his affidavit. There is no question about that.)

(Mr. Church: Let us have that verified.)

(Mr. Fish: The affidavit will be presented to this witness.)

(Mr. Church: Then the mystery will stand until that time.)

Q. 151. Mr. McBerty, how have you to your knowledge given any affidavit to Mr. Fish or the Thomson Welding Company or the Thomson Spot Welding Company or any predecessor of the Thomson Spot Welding Company or to anybody to which you have attached a specimen of your spot welding work of 1901?

A. I have given, I think, an affidavit to Mr. Howe, if my memory serves me right, but without reference to the specimen attached, I can not say definitely, because I would want to see the specimen.

Q. 152. You don't think the specimens are attached to that affidavit?

A. It does not run in my mind so, because I want to see the specimen.

Q. 153. Mr. McBerty, have you preserved any specimen of spot welding done on that 1901 machine, in 1901, to which you have referred in your testimony?

A. I have.

Q. 154. Please examine the specimen I now show you and state to the Court what it represents, who made it, and when it was made.

A. This is a sample of electric spot welding done on the old spot welding machine, the old electrode welding machine in 1901, and consists of a part of a steel center and part of a steel blade. Do you want the information in reference to its being half——

Q. 155. No, I am not calling for that. Where did this particular specimen come from, and in whose possession has it been?

A. This specimen is a piece of the original work, and has been in a tool box of mine in my various travels since I was employed at the plant of the Warren Electric & Specialty Company in 1901.

Q. 156. Please state when that particular specimen was made with reference to the production of the fans which you said you made in 1901?

A. This is about the first satisfactory specimen that was produced of spot welding when I ventured to weld a blade to a spider in the fan.

Q. 157. Explain how this particular specimen happened to be preserved by you?

A. Well, due to the fact it was something new, something I had never done before, and when completed, indicated something of value.

Q. 158. Will you please tell the Court how the blade and spider arm of that specimen were put together?

A. They were spot welded together as described in the method of spot welding the blades to the centers.

Q. 159. Go through the process, telling the Court just exactly how it was made, and by what machine, and who made it.

A. I made the sample myself; it was spot welded in the machine with the aid of the copper electrodes clamped where the guard rings ordinarily were held, put into position, pressure applied by your two pointed electrodes, current turned on, making the complete weld. It was then moved to make the second weld, and then moved to make the third weld. We did not make any particular effort to locate those as they should be located where we are designing a special plan. This piece here is made of an old fan, which was punched for rivets, and I spot welded in that position.

(The Court: No attempt made to make a practical fan blade?)

A. No attempt made to make a practical fan blade, no. In this particular instance, the other section here adjoining was not welded at all.

Q. 160. That is, nothing was welded to it?

A. No, sir.

Q. 161. How does the work of that specimen before you compare with the spot welding that had been done on the fans which you say were made and marketed in 1901?

A. It is not quite so neat a job as we did later on, due to the fact we devoted a little more attention with reference to the spot welding in the various tests we made.

Q. 162. I notice in this exhibit sample the figures 2-15-01 stamped on the metal of the fan blade. What do these figures indicate to you, and by whom were they applied?

A. That indicates the date at which this sample was completed, and put in my tool box.

Q. 163. What does the 2-15-01 mean?

A. That means February 15th, 1901.

Q. 164. Who stamped those figures on there?

A. I stamped those on there myself.

Q. 165. With what did you stamp them on?

A. An ordinary steel stamp, such as you find in all machine shops.

(The Court: When did you do it?)

A. When I produced the sample, I would say at the date indicated; there would be no reason for stamping another date on there.

Q. 166. I also notice on the same blade is stamped the name F. McBerty. When was that done and by whom applied?

A. F. McBerty; and it has been applied by myself.

Q. 167. When?

A. At the same time.

Q. 168. What means were employed by you to stamp the 2-15-01 on there?

A. I have already answered that question.

Q. 169. Can you produce those punches or whatever means were employed for making that date?

A. I can not produce the punches for making the date, those were shop articles.

Q. 170. What means were employed for marking F. McBerty on that?

A. My own personal stamp.

Q. 171. Where did you get that stamp?

A. That has been in my possession ever since I started to learn my trade in 1888.

Q. 172. What use have you made of it?

A. I use it for marking tools, metal tools, machinists' tools.

Q. 173. Is that name stamp here in your possession?

A. It is.

Q. 174. Please examine the stamp I now show you and state if you know what it is.

A. (Examining.) That is the name stamp mentioned.

Q. 175. Read what it says.

A. It says: "F. McBerty."

(Mr. Church: The stamp referred to by the witness is offered in evidence as Defendant's Exhibit L.)

(Defendant offers in evidence the sample specimen showing single fan blade and a portion of a fan center or spider, and asks that the same be marked Defendant's Exhibit M.)

Q. 176. I notice that the spider arm of this specimen, Defendant's Exhibit M, to which the blade is spot welded, is perforated in two places. Explain how that happens to be so.

A. The spider arm, that is a part of our standard production of steel spiders.

Q. 177. What are those perforations in there for?

A. To take the rivets for attaching the blade.

Q. 178. I also notice the blade of this specimen likewise appears to be perforated at two places. Will you also please explain how this happens to be so?

A. This is an old steel blade that has been punched for rivets.

Q. 179. I notice the spider part of this specimen appears to be

cut from another part; state if you know what has become of the other part?

A. The other portion of this center and the attached section of blade was turned over to J. Nota McGill, who was formerly attorney for the National Electric Welder Company, being given to Mr. McGill in 1912, and if I can have the time, there is some little information in connection with that that I would like to put in here, and I have some dates to refer to (referring to memorandum).

Q. 180. You may give the circumstances; if it will aid you, refer to your dates. I understand your claim is that the missing part is now in the custody of the plaintiff. Is that correct? You think so?

A. Yes, sir, it is supposed to be; yes, sir.

Q. 181. I will ask you to explain why you suppose that is in the possession of the plaintiff; state the circumstances leading up to your belief.

A. That is something, as I say, that will require some explanation, and I have noted down some dates and references which will bring the thing along up in regular order.

(Mr. Fish: We admit we have samples in our custody, not this particular sample.)

(Mr. Church: Go on and make your explanation.)

A. The National Electric Welder Company was organized in 1911 to manufacture electric welding machines, both spot and butt welding machines; and other concerns had been doing that line of business, and notably the Winfield Electric Welding Company of Warren, Ohio; the Toledo Electric Welder Company of Cincinnati, both of whom were making spot welding machines at that time. And after we got started, I was advised they had been threatened by suit brought by the Thomson Company or would be brought by the Thomson Company.

Q. 182. What Thomson Company?

A. The Thomson Electric Welder Company, predecessor of the plaintiff in this particular case, if I am not mistaken, under the Rietzel patent of July 20, 1909. I understand that patent was granted at that time; on December 19, 1912, the National Electric Welder Company of Warren, Ohio, were notified by the Thomson Company of the alleged infringement of the Rietzel patent as well as the Harmatta patent, which had been allowed December 3, 1912; I think I am getting the dates right. The patent attorney of the National Electric Welder Company at that time was J. Nota McGill, and when we received this notice of infringement we sent word——

(The Court: You say "we"; were you working for the National Electric Welder Company?)

A. No, I was a member of the National Electric Welder Company; in fact, I owned a portion of it; I am a partner and stockholder. I desired to have Mr. McGill take this matter in hand. Mr. McGill was consulted, and we told him at that time of the manufacture and sale of these spot welded fans and also of the samples I had in my tool box at the time. I wanted to protect our company; it was not a large company; we hadn't any large amount of money, and we didn't want to get involved in any litigation, and I thought possibly with the showing of evidence we had we could make some arrangement whereby we would be permitted to go on, so that we would not be financial losers in the long run, if Mr. McGill could so handle this affair and help us. Mr. McGill came to the plant of the National Electric Welder Company of Warren. I can not give you the exact date, but along in the early months of 1912, and looked over the welding machine, looked over our sample, and the question was raised of what would occur if we permitted the sample to get out of our hands; if with our sample gone, we had nothing to identify our work with that, and the suggestion was made they cut the sample in two, retain the identified section, permit the other section to be handled by Mr. McGill and see what he could do, merely taking this as a specimen of what we had done to back up the statement of the fact that we were new in the field, and at Mr. McGill's suggestion, the sample was cut——

(Mr. Fish: Unless this is leading up to something, we shall object to it.)

(The Court: I understood you consented to the explanation.)

(The Witness (continuing): Mr. McGill did not take this sample with him, as he had other business there in the valley, but we sent it to him, and I think I have the exact date on my slip here. I have in my possession a copy of my letter to Mr. McGill, dated February 1st, 1913, transmitting the sample to him by parcel post, and Mr. McGill's letter acknowledging the receipt of that sample was dated February 3, 1913, and we also have Mr. McGill's letter of September 5, 1913, stating he had delivered the specimen as requested to the firm of Edwards, Sager & Wooster, I think that is the name.)

Q. 183. Who are they?

A. They were the attorneys for the Toledo Electric Welder Company at that time and they were defending a suit which had been brought against the Barney Berry Company in Boston for infringement of the Harmatta patent. The Barney Berry Company were manufacturing skates and were using this welder, and the Toledo Company were manufacturing welders, and they were defending the suit with the assistance of Edwards, Sager & Wooster. I also

have a copy of my letter to Mr. Edwards, dated January 20, 1917, requesting the return of the blade and the letter from Edwards of Edwards, Sager & Wooster, addressed to the National Electric Welder Company, dated February 10th, 1917, stating that the Thomson Spot Welder Company had bought out the Toledo Company of Cincinnati, the Toledo Electric Welder Company, and the fan blade had been turned over to them and was now their property, as part of the proceeds of the sale, I suppose. The result was we never received our sample back.

(The Court: In that process, in the course of that work, did you make an affidavit for Mr. McGill or anybody?)

(The Witness: I made no affidavit to my knowledge to Mr. McGill, but Edwards, Sager & Wooster had Mr. Howe come out to Warren, Ohio, in 1913, if my memory serves me correctly, although I have no copy of any of those affidavits, yet we gathered up some information regarding the prior use of spot welding, and I can not say what sample he had or whether he had any sample with him or not.

(The Court: You did make an affidavit for him?)

(The Witness: I am under the impression I did make an affidavit for him along those lines. That, I think, is all I have to say along that line.)

Q. 184. Returning again to the steel fan blades and steel spiders that were spot welded in these two fans of 1900 and 1901, state whether or not the spider arms of those fans were perforated?

A. The spider arms of those fans were perforated.

Q. 185. State whether or not the blades of those fans were perforated?

A. The blades were not perforated.

Q. 186. How did it happen the spiders were perforated, while the blades to which they were spot welded were not?

A. They were simply standard stock, taken as they came from the stock room, and the perforations in the center would not materially affect the appearance, as it was in the rear of it where it could not be seen.

(Mr. Fish: Did you say the spiders were not perforated?)

A. They were perforated. The fan blades were not perforated, but the spiders were.

(Mr. Fish: That is, they were not taken from the stock that went through the factory?)

A. I would not say they were taken from the stock, the spiders were.

Q. 187. How about the fan blades?

A. The fan blades were punched and not perforated for rivets.

(Mr. Stackpole: The fan blades were punched, and not perforated?)

A. Yes, sir; when I say punched I mean blanked, but not perforated for rivets.

Q. 188. (By Mr. Church.) When the Warren Electric & Specialty Company were manufacturing these electric fans, under what name did they sell them, trade name?

A. Sold as the Peerless fans.

Q. 189. The Peerless fans?

A. Yes, sir.

Q. 190. State whether or not the Peerless Electric Company was formed after the manufacture and sale of the so-called Peerless fan by the Warren Electric & Specialty Company?

A. Yes, sir; the Peerless Electric Company was organized some three or four years after the Peerless fans had been placed on the market.

Q. 191. And the name Peerless was retained as the trade name for the fans, although they were not put out by the Warren Electric & Specialty Company, but by the Peerless Electric Company; is that correct?

A. That is right.

Q. 192. When the fan department of the Warren Electric & Specialty Company was sold and transferred to the Peerless Electric Company, what became of the welding machine you have been interrogated about, and what about the stock that was then on hand?

A. The old welding machine went along with the rest of the fan equipment of the Warren Electric & Specialty Company, together with all the fans they had in stock and parts.

Q. 193. To your knowledge, was the welding machine used by the Peerless Company for any purpose? If so, for what purpose?

A. The welding machine was continued in use on the steel fan guards in 1906, at which time I discontinued my connection with the Peerless Company, although the machine was continued in active service for about four years longer.

(Mr. Stackpole: Have you any personal knowledge of that fact?)

(The Court: Have you personal knowledge of that?)

(The Witness: I know from hearsay and from the superintendent of that department.)

Q. 194. (By Mr. Church): After the Peerless Company got

this welding machine, state whether or not to your knowledge it was used for spot welding fan blades?

A. Not to my knowledge.

(The Court: This was a homemade machine, was it?)

(The Witness: Strictly.)

(The Court: Who made it?)

A. Made in our own shop by Mr. Power.

(The Court: What did you have to do with it?)

A. I designed the thing, sketched it out.

Q. 195. (By Mr. Church): Did you at any time, Mr. McBerty, attempt to patent the process of spot welding as practiced by that machine in 1901 for the spot welding of blades to the center?

A. I did not.

Q. 196. Did you at any time consider the application of electric welding as a patentable subject?

(Mr. Stackpole: That is objected to, as he is not qualified to answer the question.)

(The Court: The objection is sustained.)

Q. 197. (By Mr. Church). At all events, you made no attempt to patent it?

A. I did not.

Q. 198. When to your knowledge was a spot welding machine for welding flat plain surfaced plates together by pressure and current applied to one or more electrodes first put upon the market?

A. I would say that line of product was first put upon the market along about 1908. It is rather difficult for me to say.

Q. 199. What machines first appeared on the market for doing this spot welding, so-called, and who put them out?

A. The Winfield Company manufactured the first spot welding machine that I knew.

Q. 200. When was that?

A. That was along about that time, 1908.

Q. 201. What other concerns were making spot welding machines and when?

A. The Toledo Electric Company came into the business very close to the same time, 1908 or 1909.

Q. 202. Any others?

A. Later on there was the Agnew Electric Company, I think that was the name; the Detroit Electric Welder Company, and the National Electric Welder Company about 1911.

Q. 203. Did the Universal Electric Welding Company put out a spot welder before the National Company put out one?

A. Yes, sir, they did. That is, they advertised a spot welder.

Q. 204. I show you a catalog. Will you please state what it is and about when it was put out, if you know.

A. This is a catalog of the Toledo Electric Welder Company, located at Northside, Cincinnati, Ohio, issued, according to the stamp on it, in April, 1912.

Q. 205. Does that show a spot welder? If so, give the page.

A. On the outside cover page is shown a power-driven spot welder.

(Mr. Church: Defendant offers the catalog in evidence as Defendant's Exhibit No. N.)

(Mr. Stackpole: This catalog is incomplete; there has been something cut out and it may be quite material. There are some of these catalogs in the other case, and there was a good deal of material matter in it——)

(Mr. Church: That is the only one I have.)

(The Court: You may reserve your objection and see.)

Q. 206. Please examine the catalog I now show you, and state what it is?

A. This is a catalog for electric welding machines for point, ridge and spot welding, issued by the Universal Electric Welding Company.

Q. 206. Is there anything in that catalog indicating the time it was issued?

A. The most prominent date on this catalog is the rubber stamp on the outside: "Removal, November 1, 1912, to Crystal Building, 47-48-49 West Street, New York."

Q. 207. You can testify, can you not, that at least as early as November 1st, 1912, the Universal Electric Welding Co. was putting out a spot welding machine?

A. Yes, sir.

(Mr. Church: Catalog offered in evidence as Defendant's Exhibit O, Universal catalog.)

Q. 208. You have followed this art of electric welding very closely?

A. Yes, sir.

Q. 209. Was or was not the use of spot welding machines rather slow at first? I mean to say, the use was not prevalent at once, was it?

A. It was not.

Q. 210. Can you account for the delay in the bringing of spot welding in such prominence?

(Mr. Fish: How is that material, your Honor?)

(Mr. Church: I think it will appear material.)

(The Court: You may answer.)

A. Yes, I can. In the first place, the process of producing articles with the aid of punch presses, while not new at the time—well, in the last 20 years—has developed very materially in the last ten or twelve years. Prior to that time, most of these things were made of cast iron or brass. Since that time they have drifted more to the production of parts in steel. Also, the public had to be educated in the use of electric spot welding. The majority of the people were afraid of electricity in practically every form, and the use of the alternating current was not anywhere near as general in 1901 to 1906 or '07 or '08 as it is at the present time, and most spot welders were built to operate from electric current.

Q. 211. Has the fact that sheet metal has replaced wood in many departments had any effect upon the use of spot welding machines?

A. Yes, sir, that has done more to increase the use of spot welding machines and encourage it than all the other things that have ever been done, that is, the substitution of sheet metal in place of wood—sheet steel.

Q. 212. Lest I forget it, I will now here ask you whether or not to your knowledge there are now on the market any steel-bladed fans, desk fans, that are spot welded?

A. I have never seen any steel bladed desk fans that were spot welded, other than those I have spot welded myself.

Q. 213. How are electric fans, such as is on his Honor's desk there, how are the fan blades of electric fans generally connected to their spiders?

A. Generally connected to their spiders by aid of rivets.

Q. 214. Have you gone to the different factories as well as to dealers to see if you could find some spot welded fans?

A. I have, and since this question has come up I have looked very closely for spot welded fans.

Q. 215. Can you account for the fact that with the prevalence of spot welding and the prevalence of electric fans, that have steel blades, there are not any that are united by spot welding?

A. They are more easily assembled when they punch the holes for the rivets both in the centers and in the blades.

Q. 216. Does it seem to be a more practical way of making fans?

A. It seems to be a more satisfactory process economically, as it eliminates the necessity of having jigs to hold them in place while they are welding.

Q. 217. Now, how are blades connected by rivets to their spiders, in modern practice? By hand operation or by machine? Has any improvement been made in that respect?

A. There has been a very decided improvement made in that respect, because they rivet those things by the aid of power, by compressed air power or electricity.

Q. 218. When the National Electric Welder Company with which you were connected began to manufacture and sell the spot welders in 1911, state whether or not the Harmatta patent in suit had been issued?

A. It had not.

Q. 219. Did you, or to your knowledge, did anybody, connected with the National Electric Welder Company know when that company embarked in business there was such a thing as the Harmatta application pending in the Patent Office?

A. They did not.

Q. 220. Had you ever heard of such a situation?

A. I never had.

Q. 221. When did you first learn there was a Harmatta patent or Harmatta application for a patent?

(Mr. Fish: That is objected to as immatreial.)

(The Court: It has some reflected possibility, I think. You may proceed.)

A. I did not know anything about it until after that patent was issued December 3, 1912.

Q. 222. When was the National Electric Welder Company notified of the infringement by the Thomson Electric Welding Company?

A. I think December, 1912.

Q. 223. Please examine the paper I show you and state if you know what it is?

A. This is a letter from the Thomson Electric Welding Company, Lynn, Mass., addressed to the National Electric Welder Company, Warren, Ohio, informing us that they had been granted a patent, giving the patent number as 1,046,066, granted December 3, 1912.

Q. 224. You were notified also in that of the infringement of another patent, were you not? What was it?

A. And also patent 928,701, granted July 20, 1909, was infringed by the machine we offered on the open market.

Q. 225. That last patent was the Reitzel patent, was it not?

A. It does not say so here.

Q. 226. It is a fact it was?

A. I take it for granted that must be it.

(Mr. Church: The paper referred to by the witness is offered in evidence as Defendant's Exhibit P.)

Q. 227. This, I see, was the notice of December 19, 1912, claiming infringement of the Harmatta patent, granted December 3, 1912; the Bill of Complaint in this case states that the suit in Boston against Barney & Berry on the Harmatta patent was brought March 13, 1913, and was tried in open court before Judge Dodge, April 1st, 2nd and 3rd, 1914; were you present at that trial, throughout the trial?

A. I was.

Q. 228. You were called as a witness for the defendant in that case and gave testimony, did you not?

A. Yes, sir, I did.

Q. 229. What did you expect to give testimony about in that suit?

A. Regarding the early use of spot welding by myself.

Q. 230. Did you testify in that suit as to the manufacture and sale or public use of steel-bladed, spot-welded fans by the Warren Electric & Specialty Company in 1901?

A. I did not.

Q. 231. Did you testify as to the prior use by you of such spot welded fans in 1901?

A. I did not.

Q. 232. Were you, while on the stand, not asked by defendant's counsel as to your early work of spot welding?

A. I was.

Q. 233. What did you answer?

A. I started to answer, but was not allowed to finish.

Q. 234. Why were you not allowed to answer?

A. Mr. Fish objected.

(Mr. Fish: State the ground, while you are on that line.)

Q. 235. I hold in my hand a printed copy of the record of appeal in the case of Thomson Electric Welding Company and Universal Electric Welding Company vs. Barney & Berry, Inc., in the Circuit Court of Appeals for the First Circuit, and find therein what purports to be your testimony given in that case on examination by defendants' counsel, Mr. Edwards, and you were asked as follows:

"Int. 22: When the National Electric Welder Company commenced to put these machines upon the market in 1911, did it have any knowledge of the pendency of the Harmatta patent in connection with spot welding of any kind?

A. Not any whatever.

Int. 23: You had never heard of Harmatta before?

A. Never heard of Harmatta.

Int. 24: Did you know that the complainant had any interest in any Harmatta patent or application?

A. Not any.

Int. 25: When you put these machines upon the market, was this your first acquaintance with this process of so-called spot welding?

A. It was not.

Int. 26: Had you ever practiced it before?

A. Yes, sir.

Int. 27: State when and where, and under what circumstances.

A. In the year 1901 I manufactured an electric welding machine——

(Mr. Fish: If this is by way of interest, it is not set up in the answer and therefore it is not competent.)

(The Court: I think I shall have to exclude that.)

(Mr. Edwards: And I save the exception, please.")

This record account of what happened in the Barney & Berry suit I have just read is what you attempted to explain in your testimony a few moments ago, is it not?

A. It is. That is what I had reference to.

Q. 236. Did Mr. Edwards, defendant's counsel in that suit, offer to you any explanation as to why you were not allowed to testify about your early work in 1901?

A. He did not.

Q. 237. Were any of the witnesses in support of your claim to having done this work in 1901 present there in court?

A. They were not.

Q. 238. Were any of them subpoenaed or asked to be present that you know of?

A. Not to my knowledge.

Q. 239. Were you surprised that you were not permitted to testify?

A. Very much so.

(Mr. Fish: That is objected to; whether he was surprised or not is not material.)

(The Court: I do not think that is material. That would be a matter better addressed to the court.)

Q. 240. Were you prepared to testify as to your early work in 1901 at the trial of the Barney & Berry suit?

A. I was to a certain extent.

(Mr. Church: Would it be advisable to have a very short recess? We had expected to ask your Honor to go out to the Ford works, but as it is too late, we will ask you to go out with us early in the morning. We cannot go tonight, because the works are shut down.)

(The Court: How long will it take to do that?)

(Mr. Church: Possibly three-quarters of an hour, going and coming.)

(The Court: We will take a short recess now.)

Recess.

Q. 241. (By Mr. Church). Mr. McBerty, I show you again this sample, Defendant's Exhibit M, and ask you to closely examine it and see if it is in the same condition that it was when you offered it in evidence before recess?

A. I would say that this sample in question has been scratched with some hard instrument, sufficiently hard to cut into the metal, right at the particular rivet hole about the center of the sample.

Q. 242. During the recess, were some sketches or drawings made of this sample by those in the court room?

A. Yes, sir.

(Mr. Fish: Show me what you mean by scratches.)

(Mr. Church: Now, may it please the Court, there is a very nice question here arising; we have put in our sample in good faith, and during recess this sample has been tampered with, and we now insist, with all deference, that the plaintiff should produce the counterpart of this sample. They have taken drawings and sketches of our sample, and I do not know what may be done overnight. If it does not correspond now, correspondence could be made over night, and I think good faith requires that the other portion of the sample be now produced for our inspection and for identification by the witness.

(The Court: Without at all intending to endorse the inferences that may be involved in what you have said to the Court, Mr. Church, it seems to me that there is no valid physical reason, at least, why the alleged counterpart of this sample should not now be produced, because seeing this, and assuming the counterpart is a similar end, the other part may be detached from the affidavit without any trouble and presented to the court as part of the affidavit, so that it might be preserved as part of the affidavit and then what might be unpleasant feelings of counsel thus avoided.)

(Mr. Church: Let us see what you have got, Mr. Stackpole.)

(Mr. Stackpole: I have sent one of my assistants for it in the clerk's office.)

(The Court: You say it is in the clerk's office?)

(Mr. Fish: There is no counterpart.)

(Mr. Stackpole: We have no counterpart of the fan blade.)

(Mr. Fish: What do you say we have a counterpart of, Mr. Church?)

(Mr. Church: The witness' testimony is it was a portion of the spider.)

(Mr. Fish: We haven't anything that fits that at all (referring to the part that has been brought in from the clerk's office).)

(The Court: Better leave that here; I will take charge of it.)

(The Witness: How can I tell it is the other part unless I examine it?)

(Mr. Church: I felt a little bit sore when the witness told told me this had been scratched during the short recess we had.)

(Mr. Fish: It should not have been scratched or touched in any way, of course, and I don't know who did it.)

(Mr. Church: It may have been done inadvertently, but this is certainly a critical situation.)

(Mr. Fish: How do you know it has been scratched?)

(Mr. Church: The witness has sworn it has been scratched.)

Q. 243. (By Mr. Church). Before recess you were being interrogated in regard to the proceedings in the Barney & Berry suit, at which you were present. It appears from the record that has been read here of that suit that an objection was in effect made to your testimony in regard to your early work because it had not been pleaded in the answer; was any effort made at the time to have the answer amended while you were present in court?

A. Not to my knowledge.

Q. 244. Was there any effort afterwards made to amend the answer, according to your knowledge?

A. Not to my knowledge, no, sir.

(Mr. Stackpole: Mr. Church, may I handle this exhibit?)

(Mr. Church: Oh, certainly, sir (referring to Defendant's Exhibit M).)

(Mr. Fish: I do not know what they mean by counterpart, but there is all there is attached to the affidavit (handing to the Court).)

Q. 245. During the progress of the Barney & Berry suit, I mean, in the trial of that suit, what, if anything, came to your knowledge or was brought to your attention indicating that a settlement or understanding between plaintiff and the actual defendant in that suit was in progress?

A. My first intimation——

(Objected to.)

(The Court: The witness cannot testify to anything except what he had direct knowledge of. If he heard any conversation between the parties, he may testify to that.)

A. My first intimation of this trial coming off on the 1st day of April, 1914, was a telegram from Boston requesting my presence there on the morning of April 1st, to attend that trial as a witness. I do not remember the exact wording of the message or just how it was signed.

(The Court: Did you go?)

A. I got it the day before the trial and I promptly took the train and was there the first of April. After we had attended the court that day, I spent the evening with Mr. Frank Warren, who was at that time, I believe, the general manager of the Toledo Electric Welder Company of Cincinnati, Ohio. Mr. Warren was very much exercised over the condition of affairs. We went out and had a little lunch together, and we walked the streets a while and he told me what his troubles were. Mr. Warren said he had——

(Objected to.)

(The Court: This all took place away from the plaintiff or any representative of the plaintiff, so it is not competent.)

(Mr. Fish: Another objection is that Mr. Warren is dead.)

(The Court: I cannot say that is as valid an objection as the other.)

(Mr. Church: I think what the witness is trying to tell, if

permitted, has relation to this Barney & Berry Company only as a nominal defendant, suit being actually defended by the Toledo Welder Company with Mr. Warren as its representative. What the witness desires to tell, if permitted, is in regard to the negotiations that were going on between Mr. Warren and the plaintiff during the trial.)

(Mr. Fish: No, he wanted to say something that Mr. Warren had said.)

(The Court: He cannot testify to anything Mr. Warren said. If he had any negotiations himself, or if he has any direct information as to that, he can testify to it.)

(Mr. Church: I think he was, because we will show ultimately that im ediately this patent was sustained, the Toledo Company was sold out to the plaintiff. I understood Mr. Fish to say that.)

(Mr. Fish: I did not say immediately, but some time after, negotiations were taken up. A trade was made by which the Toledo Company was bought out in settlement of this litigation. No question about that. I have hardly ever been engaged in a patent suit but what I have tried to settle it the very day suit was brought. But there were no negotiations of any kind during that trial.)

(Mr. Church: We are leading up also to the report Mr. McBerty made to his counsel as to what he discovered on that trial. The letters are here, showing this is not a new story, but it was the impression at the trial. It seems to me it is competent, because if they rely upon an adjudication as having sustained their patent, they ought not to be permitted to have the suggestion made that the suit was honestly tried, and all the defenses presented. Our idea is this McBerty defense was suppressed for some reason or other, whether a good reason or bad, but it was suppressed. He went on to testify and was not permitted to testify. And, furthermore, if permitted, we will show negotiations for a settlement were made all during that suit, and he went home and reported as to what he had heard, and indicated he was well satisfied there had been a settlement when the case should have been fought out.)

(Mr. Fish: The suggestion my brother Church makes I think is nothing less than outrageous, and it should not be made without some scintilla of evidence; if he would approach it with any evidence, we would meet it, but scandalous attacks are not evidence.)

(The Court: I think that is so. What this witness says is private conversation with Warren and is not competent testimony, nor what he reported to his counsel of his impressions at the time would be competent testimony, not now anyhow, but if he himself was a party to the negotiations or overheard any of the negotiations, or saw anything that tended to suggest a process of negotiation, that would be competent.)

Q. 246. (By Mr. Church). You were interested in the negotiations, were you not?

A. Yes, sir, I was.

(Mr. Church: Of course, he would be liable as an infringer and in a sense he was taking part in them, and then he was to get rights.)

(The Court: And did that proposition come to him from the plaintiff?)

(Mr. Church: That I don't know.)

(The Court: It is only what this witness is able to tell us and knew what the plaintiff did that can be evidence in this case.)

(Mr. Fish: This is a minor matter, but the Court may be interested in knowing there is no suggestion of this in the answer.)

(Mr. Church: I will withdraw the question.)

Q. 247. (By Mr. Church). Before this suit of Barney & Berry came on, you went to Boston to confer with people connected with the Thomson Welding Company, did you not, the predecessor of this plaintiff?

A. Yes, sir, I did.

Q. 248. Whom did you meet in that connection?

A. I met, first, Mr. Hodges. By the way, this was at Lynn, Mass., not Boston. Then Mr. Hodges called in a gentleman by the name of Mr. Spinney, who, I understood, was the president of the Thomson Electric Welding Company. And, later on, they had Mr. Elihu Thomson come over there to the plant, and I talked with him, and at their request——

Q. 249. What did you talk about?

A. We talked about the prior use of the art.

Q. 250. Art of what?

A. The prior use of spot welding.

Q. 251. By you?

A. Yes, sir.

(The Court: About this use you have been testifying to here?)

(The Witness: Yes, sir, exactly the use I have been testifying to here, the use of this particular machine and this particular job. Mr. Hodges did not pay much attention to it at first, until I showed him that piece of sample, and he took it up with Mr. Spinney, had Mr. Spinney come in, and we talked it over again, and they asked me if I would not oblige them by going to Boston in the morning and seeing Mr. Fish and telling him what I had told them, which I agreed to do. And they arranged, I think, by telephone for a meeting between myself and Mr. Fish at, I believe, it was 86 State Street, Boston, the following morning at nine o'clock. I called there and explained to Mr. Fish what I had done, showed him my sample, told him who I was, what my business relations were, the firm I was connected with, and asked him if they were in position to make an arrangement with me whereby I would not be disturbed in my manufacturing interests, or whether they could see any way to make a proposition to me to permit me to get out of the business and avoid any litigation. Mr. Fish's answer was—I cannot give it in the exact words, but it was something to the effect, after thinking over what I had told him, his impression was this work had been done in the light of an abandoned experiment, and he did not know whether he was in a position to suggest any deal that we might make that would permit me to get out of the business, as he was not in control of the Thomson Welding people. My suggestion was that the Thomson Welding Company would buy me out, and I would quit that line of business.)

Q. 252. How long did that interview with Mr. Fish last?

A. I would say 20 or 30 minutes, not much longer than that; it did not take very long.

Q. 253. What did you show Mr. Fish in that connection?

A. I showed Mr. Fish the other portion of this fan.

Q. 254. Did you have this portion of the sample with you?

A. No, sir, I never had this portion of my sample away from the plant at Warren, Ohio.

(The Court: Was it that spider of which this Exhibit M is a part?)

(Mr. Fish: Your Honor understands what the spider is, it is not the blade.)

(The Court: Oh, yes, I understand. It is the cross over to which the blades are attached. Did that have all four blades attached to it, originally?)

(The Witness: No.)

Q. 255. How many blades did it have?

A. It had three blades, if my recollection serves me right, and they were cut diagonally across, leaving him that short stub, which never had anything welded on, and the one section of the blade, which I have there.

Q. 256. This is not a complete blade?

A. No, that blade has been cut off. The upper end has been cut off. There were, I think, originally two complete blades.

Q. 257. And that particular portion of the blade was cut off?

A. Yes, sir.

(The Court: Was this originally complete, or was it a piece you picked up and put on?)

A. That was originally complete.

Q. 258. Was it cut off after it was welded to the spider?

A. Yes, sir, cut off quite a long while after it was welded to the spider; the outer end, the widest end was cut off.

Q. 259 (By Mr. Church). That was what you showed to Mr. Fish?

A. Yes, sir.

Q. 260. Did you have any other samples of your spot welding work at that time?

A. I don't remember of having any particular sample, excepting that blade and the short piece of a sample.

Q. 261. Did you submit to Mr. Fish any affidavits?

A. I had affidavits from Mr. F. G. Brown and E. C. Lipps, two men who formerly worked with me in the Warren Electric and Specialty Company's plant, and who had knowledge of this machine, and these were the men that I recollected as being men exceptionally skilled in mechanical lines, and being the most convenient to get at, for I wanted to get evidence of sufficient backing to substantiate the facts pertaining to this original welding and what I had done with it. These affidavits I got myself.

Q. 262. What became of that part? Did you leave it with Mr. Fish or take them away?

A. I think I took them away. My impression is I returned the others, and they were turned over to Mr. McGill.

(Mr. Fish: To Mr. McGill?)

A. Yes, sir, to J. Nota McGill.

(Mr. Church: I presume it will be admitted, it has not already been adequately proved yet, that a sample or part of a sample of spot welding work was given to Mr. Edwards by

Mr. McBerty or by his attorney, Mr. McGill, and was turned over by Mr. Edwards to the Spot Welding Company. Is that admitted?)

(Mr. Fish: The only thing we admit, as far as I know, and the whole truth is, that we have a series of affidavits that were taken by Mr. Howe for Mr. Edwards in order to give him an opportunity to determine whether it was necessary to put in this defense. That set of affidavits is all I know of. Nothing else of any sort or kind, except this full set of affidavits that Mr. Howe took.)

Q. 263. (By Mr. Church) Mr. McBerty, I show you a paper and ask you to state, please, what it is.

(Mr. Fish: Before he reads it, I would like to see it, Mr. Church.)

(Mr. Church: Yes, it is a letter of transmission, of—or a copy of—of the blade to his counsel, Mr. McGill.)

(Mr. Fish. Is that material, a letter of transmission of something to his own counsel?)

(The Court: You may examine on it.)

Q. 264. What does that purport to be?
A. That is a letter in answer to a request of Mr. McGill for sample or specimen of fan blade—
Q. 265. What is the date of that?
A. February 1st, 1913.

(Mr. Church: I offer in evidence the letter transmitting a fan blade to Mr. McGill.)

(Mr. Fish: You offer to prove the fact he did transmit the fan to Mr. McGill?)

(The Court: There is no contest on that subject, is there?)

(Mr. Fish: This exhibit I never heard of and don't know anything about it, and this certainly does not tend to prove the fact. He says:
"Mr. Edwards is out of the city"—)

(The Court: What I want to know is this: This is offered only to prove that the sample in question was transmitted by Mr. McBerty to Mr. McGill?)

(Mr. Fish: No, there is something about Mr. Edwards. I don't know what. Will your Honor read the letter, and your Honor can see what it is.)

(Mr. Church: I offer it in evidence. It reads:

"February 1st, 1913.

J. Nota McGill,
McGill Bldg., Washington, D. C.

Dear Sir:

Re, Your letter January 29th, 1913.

We forwarded you today by parcel post (registered) the fan blade which was spot welded in 1901 or thereabouts.

We could not give this more prompt attention due to the fact that Mr. McBerty was out of the city, and the writer could not get into the box in which he keeps his valuables (?)

Hoping this arrives without any unnecessary delay, we are

Very respectfully yours,

THE NATIONAL ELEC. WELDER CO.

By

ZAM/LS Assistant Sec'y.

I offer that in evidence as Defendant's Exhibit Q.)

Q. 266. Please examine the letter I now show you and state what it is.

A. This is a letter under J. Nota McGill's heading, dated the 29th of January, 1913.

Q. 267. And that is the letter that calls for a fan blade, is it not, calls upon you for a fan blade?

A. Yes, sir; it says:

"Please send me one of the fan blades which was spot-welded in 1901 or thereabouts. I mean one of the two which Mr. McBerty showed me when last in Warren. Let him mark it in some way so that he can hereafter identify it when returned."

Q. 268. That is the letter to which this was a reply, that you offered a moment ago, because this states:

"Re, Your letter January 29th, 1913. We forwarded you today by parcel post (registered) the fan blade which was spot welded in 1901 or thereabouts."

That is correct, is it not?

A. Yes, sir.

(Mr. Church: I offer this letter of Mr. McGill's, dated January 29th, 1913, as Defendant's Exhibit R.)

(Mr. Fish: This is clearly objectionable, but I don't object to it, particularly, as it has my name in it.)

Q. 269. Now please examine the letter I now show you.

A. This is another letter from J. Nota McGill, dated February 3rd, 1913.

Q. 270. What does it say about the blade welded in 1901?

A. It says:

"I have your letter of the 1st instant and also the blade welded in 1901. Mr. Fish advises me that he may be able to make an appointment for some day next week."

(Mr. Church: The letter is offered in evidence as Defendant's Exhibit S.)

Q. 271. Now please examine this letter and tell what it is.

A. This is a carbon copy of a letter addressed to Messrs. Edwards, Sager & Wooster, United States Express Building, 2 Rector Street, New York City. Dated: January 20, 1917.

Q. 272. From whom is that letter?

A. This is from the National Electric Welder Company, per the secretary and treasurer.

Q. 273. Is there any reference in that letter to the fan blade sample, if so, read it out.

A. It says:

"If you will remember Mr. Warren and yourself requested us to supply such information as we had available regarding the prior use of the art, and the writer mailed you at that time, a sample of an electric fan blade, which was spot welded together with some affidavits covering the process, and sent for the facts in connection with the operation, as would be of interest in the defense of the suit.

"We would be pleased to have you return to us at your earliest possible convenience samples, and the affidavits, as I understand that the information contained in the affidavit and the sample were not used at the trial at that time, and we would like to have this information at our hand here, in case we found it desirable to use it at some future date.

"As the writer understands it, the Toledo Electric Welder Co. have liquidated, and have been taken over by the Thomson Spot Welder Company, and we would like to know what your opinion was, regarding the handling of this case, now that the matter is closed."

It is signed by the National Electric Welder Company, Warren, Ohio.

Q. 274. Who signed that letter?

A. It is apparently written by me.

(Mr. Church: It is offered in evidence as Defendant's Exhibit T.)

(Mr. Fish: I object to that letter, but if your Honor overrules it, I will offer no protest.)

(The Court: It is admitted.)

Q. 275. I now show you copy of a letter and ask you what it is and from whom it was received?

A. This is a copy of a letter received from Edwards, Sager & Richmond, 2 Rector Street, New York, addressed to F. P. McBerty, National Elec. Welder Co., Warren, Ohio:

"Dear Sir:

Replying to your letter of inquiry regarding the sample of fan blade and affidavit, we beg to say that we examined this matter very carefully at the time it was presented and did not press the point of the exclusion of the evidence by Judge Dodge because, in our opinion, it would have been ineffective against the Harmatta patent. We considered that it would have been regarded by the court as an abandoned experiment. We understand that the National Electric Welding Company, as well as practically all other makers of welding machinery in the United States, is now licensed under the Harmatta patent, and, in view of the fact that the preparation of the affidavit was entirely paid for by the Toledo Company, and in view of the fact that the assets of the Toledo Company have been transferred to the Thomson Spot Welder Company, the affidavit and sample are now the property of the Thomson Spot Welder Company and cannot be delivered without an order from that company. Will you, therefore, take the matter up directly with the Thomson Company?

Yours very truly,

EDWARDS, SAGER & RICHMOND."

(Mr. Church: That is offered in evidence as Defendant's Exhibit U.)

(Mr. Fish: I will go through the form of objection, but expect it to be overruled.)

(The Court: It is admitted.)

(The Witness: It was upon that showing we called upon them for the sample and the sample we thought we were going to get does not appear, and where it is, I don't know.)

(Mr. Fish: What is referred to is the sample attached to this affidavit?)

(The Court: The record will explain itself in that respect. Of course, you may have a different construction of the record.)

(Mr. Church: There are one or two questions I cannot well put to the witness until we have seen the welding machine and operated it, and, accordingly, although I regret to ask for an adjournment, I think that will have to be done.)

(The Court: I am not very sanguine now, at the end of the first day, that we can get through by Wednesday. It is long past the usual hour of adjournment, because I thought you would be willing to stay a little longer. If you can use the time, we can proceed for a few minutes with another witness.)

(*McBerty's testimony continued, page 276.*)

OTTO F. BARTHEL.

OTTO F. BARTHEL, after being duly sworn on behalf of the defendant, testified as follows:

Direct examination by MR. CHURCH:

Question 1. Please state your name, age, residence and occupation.

Answer. Otto F. Barthel; age, 43; patent attorney, residence, Detroit, Michigan.

Q. 2. You were requested to make search in all likely places for one of the steel-bladed, spot-welded fans said to have been put out by the Warren Electric & Special Company in the year 1901. Will you please tell the Court what you did in that behalf, and the result of your effort.

A. I caused certain advertisements to be placed in various papers throughout the country in the principal leading cities like Chicago, Cincinnati, Boston and other places, advertising for a fan of this type G, and to which I received a number of replies, but on running down the various replies, the particular fan we were seeking for, sample of G-2, we did not find. I found a number of Peerless fans, and, as I say, I got numerous replies, but there wasn't a single case where we found the type G-2 fan with the spot welded blades. I have a large number of these letters here if you care to see them, also copies of the advertisements from some of the papers.

Q. 3. You are willing to submit those for cross-examination, are you?

A. Certainly.

Q. 4. What else did you do in the way of making an investigation to endeavor to find any of those fans? Did you make any personal investigation?

A. I made a great many, visiting a great many concerns, princi-

pally second-hand dealers and electric dealers in Philadelphia, for example, and, as I say, ran across a great many fans, some of the Peerless make, even, but none of the spot welded blades. I also went to New York and stayed a week and visited a great many of the second-hand stores, and electric jobbing houses along Center Street, I believe it is, but without any success there, although I did find Peerless fans. I can give you a list of some of these places I called at if you care for it.

Q. 5. If you can conveniently do it, suppose you do so. I think it would be sufficient to give a list of the places if you have it before you, and the list of the newspapers in which you advertised.

A. This was in 1918, one trip I know of, was along the early part of July, and the other was, I believe, in April. I called at the Hanover Electric Company, 42 Beaver, near Broad Street. On T. B. Laetham & Company, 4 Murray Street, New York City, and I have a memorandum here of seeing G-2 fans, or that they handled G-E fans. I called at Edgar A. Goetz, 55½ Brooklyn Avenue. C. C. Davey Electric Shop, 826 Fourth Avenue, near Forty-sixth. N. S. Newman, 49 Maiden Lane, second-hand dealers. Bernard G. Goldberg, 120 Center Street. He was a second-hand dealer also. I found a lot of fans there, but not the one I was after. On Swartz & Allen, 207 Center Street. They were second-hand dealers. Nathan Klein & Company, 208 Center Street. I found a lot of fans there, but no Peerless at that time, I think. He told me he had sold five shortly prior to that. And the Aneco Motor Electric Company, 217 Center Street. They had no fans there. The Reliable Electric Motor Company, 165 Grant, corner of Center. They had lots of fans there, but not the one I was after. E. S. Gray, 120 Center Street. They had a small E-2, 16-inch direct current fan of that type. George Binder, 920 Center Street. They did not have any. I called at 168 Center Street; they had two fans there, one with the ring, but not of the particular type I was after. On Benjamin, 170 Center Street. He had a lot of fans, but not the one I was after.

Q. 6. Without reading more names, how many more names have you on the list?

A. There are quite a few more here. I can give you some names in Philadelphia if you want.

(Mr. Stackpole: If you want the list, why not prepare it and file it?)

(Mr. Church: I do not think that would be necessary.)

Q. 7. Please state how many places you went to.

A. Well, I went to at least, I would say 15 places in Philadelphia.

Q. 8. Did you investigate in any other city?

A. At Cleveland I looked around some, and in one or two other

cities where I happened to be casually, making trips but not special trips. I might state I found, however, in going to a good many of these places, particularly in Philadelphia, that the people remembered of someone else having been there looking for a fan about a year previous to my visit. I also found among dealers when I made this search in 1918 that they stated it was a very hot season the year before, and they were pretty well cleaned out with second hand fans, and they counted that as one of the reasons why this kind would be practically unprocurable. In some places where I went, Mr. Smith, I believe they told me, had been there looking for fans also.

Cross-examination by MR. STACKPOLE:

X-Q. 9. You say Mr. Smith. You mean Captain Smith?

A. I believe it was, but I have not the initials here.

X-Q. 10. The one who testified in this case for the defendant?

A. I could not say, I have not the initials here, but that was the impression I labored under.

X-Q. 11. Did you get any Peerless fans with steel rings?

A. I could not say as to that; I was not particularly interested in the steel rings.

X-Q. 12. Did you get any Peerless fans with steel blades?

A. I don't believe so, although I think at the Colonial Hotel, on top of the telephone booth there was one with black enamel, I believe.

X-Q. 13. You don't know whether it was steel or not? Did you examine it?

A. I did not take it in hand. It was six or seven feet up above the floor line.

X-Q. 14. And the blades were riveted?

A. Yes, but they looked to be black instead of brass.

X-Q. 15. And that was the only one—

A. That might have been from age. In most of those second-hand shops the fans you look at are so dirty and the places are so unsuited to make an investigation that you have to have overalls on to do it well.

X-Q. 16. Did you run across any Type G-2 fans with blades riveted to the spiders?

A. My impression is that I did, but in this memorandum I do not find any. I find E-2. I think though I had a reply to an advertisement stating they had a G-2.

(Mr. Stackpole: That is all, your Honor.)

(The Court: We will adjourn until ten o'clock tomorrow morning, going to the Ford plant first. We will start from here at a quarter past nine.)

(Then adjourned.)

Tuesday, May 20th, 1919.
Court re-convened at 11 A. M., with the same parties present.

F. P. McBERTY resumed the stand and his direct examination was continued as follows:

Examined by MR. CHURCH:

Q. 276. Will you please examine this letter which I now show you and state what it is, and by whom it was received, and from whose possession it came?

A. This is a letter from J. Nota McGill, dated Washington, September 2nd, 1913 advising that he had received a letter from the National Electric Welder Company, Warren, Ohio, of the 30th of August, enclosing the letters of the use witnesses. It says:

> "These I shall turn over to Mr. Edwards on Friday next, nothing preventing, together with copies of the affidavits, the sketch, and the fan blades. I think it would be of great assistance to Mr. Edwards if Mr. McBerty could be with him when examining our witnesses. Of course, the Toledo Company would have to pay the expenses of his trip.
>
> "As I am sailing direct for Antwerp I shall hope to see Mr. McBerty's brother.
>
> "Possibly if Mr. Warren calls on the British Company they may agree to waive the balance.
>
> Very truly yours,
> J. NOTA MCGILL."

Q. 277. To whom is that letter addressed?
A. To the National Electric Welder Company, Warren, Ohio.
Q. 278. And it is produced from the files of that company?
A. It is.

(Mr. Church: I offer it in evidence as Defandant's Exhibit V.)

Q. 279. I also hand you another letter and ask you to state the date of it, from whom it was received, by whom it was received, and from whose custody it has been produced.

A. This letter is signed by J. Nota McGill, dated September 5, 1913.

Q. 280. Is there any reference in the letter to the fan blades, if so, please read it to the Court.

A. It is addressed to the National Electric Welder Company, Warren, Ohio, and the first paragraph reads:

> "I have had an extended interview with Mr. Edwards, the attorney for the Toledo Company, and have turned over to

him the several notes of introduction of use witnesses and copies of their affidavits and the specimen fan blade."

(Mr. Church: I offer this in evidence as Defendant's Exhibit W.)

(Mr. Fish: Let me see it, please. It is objected to as pure hearsay. I rather hope your Honor will overrule the objection.)

(The Court: Oh, it is undoubtedly pure hearsay. Are you making an objection? At any rate, you don't care whether it goes in or not, that is, evidence of this character?)

(Mr. Fish: I don't know that I want to have that excluded. We recognize its objectionable character, but we are willing to have it go in.)

Q. 281. Please examine the letter I now show you and state the date of it, to whom it is addressed, by whom it is signed, and from whose custody the letter is produced.

A. It is on the letterhead of Edwards, Sager & Wooster, 2 Rector Street, New York, addressed to F. P. McBerty, c/o National Electric Welder Company, Warren, Ohio, dated September 20, 1913. It refers to the spot welding suit.

Q. 282. Will you please read the first paragraph?

A. (reading)

"We have received from Mr. McGill the data regarding the early use of spot welding by the Warren Company. We would like to send Mr. Howe, of this office, to interview yourself and the other witnesses of this use in order to put the matter in the shape of affidavits, and also to investigate any collateral evidence that might be developed in order to corroborate the various witnesses."

(Mr. Church: I offer that letter in evidence as Defendant's Exhibit X.)

Q. 283. I notice in the letter from Mr. McGill to the National Electric Welder Company this statement:

"Please send me one of the fan blades which was spot-welded in 1901 or thereabouts. I mean one of the two which Mr. McBerty showed me when last in Warren. Let him mark it in some way so that he can hereafter identify it when returned."

Please state whether you did mark a blade and send to Mr. McGill in response to Mr. McGill's letter, and how you did mark it.

A. I did mark it; and I stamped it with my private stamp, name, F. McBerty.

Q. 284. With what did you stamp your name?

A. With the same steel stamp shown in evidence here yesterday.

Q. 285. Mr. McBerty, over how long a period have you given attention to this subject of electric welding?

A. Ever since 1901.

Q. 286. And have you been intimately connected with it since that time?

A. To a certain extent all the time since.

Q. 287. Now state the range of thickness of plates that may be spot welded as demonstrated by actual tests or performances made by you.

A. I have welded plates ranging from one to two pieces of stock, .005 in thickness, up to material that consists of two pieces 7/8 of an inch in thickness.

(The Court: You mean a combined thickness of 7/8 of an inch?)

A. No, the thickness of each piece.

Q. 288. I show you some plates welded together and ask you to tell the court the thickness of those plates.

A. Those plates are approximately 1/8 inch in thickness.

Q. 289. How are they connected?

A. Spot welded together.

Q. 290. How much does one plate overlap the other?

A. That is about 1/4 of an inch, maybe a trifle more or less.

Q. 291. Who welded these plates together?

A. I did.

Q. 292. When?

A. Last week.

Q. 293. Did you do it at my request?

A. Yes, sir.

Q. 294. Tell the Court what kind of an electrode you used on that weld?

A. On this particular job the lower electrode was 3/4 of an inch in diameter across the flat top round; the other electrode was 3/8 of an inch thick across the point of contact on the metal. That is, it was rounded to 3/8 inch diameter at the point of contact.

Q. 295. It was rounded to 3/8 of an inch at the point of contact, you say?

A. Yes, sir. The bearing surface was flat at the end of the electrode placed?

Q. 296. How near the end of the upper plate was the small electrode placed?

A. The point of the electrode was placed, as near as I could get it with the eye, perfectly even. The two edges were in a direct line vertically.

Q. 297. Would you call the welding shown on that exhibit as spot welding?

A. Yes, sir.

Q. 298. Are the welds on that exhibit surrounded by portions of unwelded metal?

A. That is difficult to say, but I would say one or two of them were, and one of them was not—on one plate.

Q. 299. Do these welded portions serve the purpose of rivets?

A. They do.

(Mr. Church: I offer these plates in evidence and ask they be marked Defendant's Exhibit Y.)

Q. 300. Will you take the two plates I now show you and state what they represent, the thickness, and how they are connected?

A. These are a couple more pieces of ⅛ inch stock steel; they have been lapped over about 1 inch and apparently two spot welds put in, so that they would go through at the center of the lap, and the third spot weld has been put in there very close to the edge.

Q. 301. Would you characterize all these weldings as spot welds?

A. Yes, sir.

Q. 302. Was there any difference in the process or method of producing those several welds?

A. Absolutely not; the only difference being the work was shifted between the electrodes before the weld was made.

Q. 303. But the process was the same?

A. The process was identically the same, and apparently the current and the points of contact were the same.

(Mr. Church: I offer these plates in evidence and ask that they be marked Defendant's Exhibit Z.)

Q. 304. If you take a conventional electric spot welding machine and fasten two plates together by means of pressure, and current applied at the part where you desire to weld, is the process different, whether you make the weld in the middle of the sheet, or remote from the edges, or at the edges on the sheet or anywhere else on the sheet?

A. It is not.

Q. 305. The same identical process?

A. The same process in every instance.

Q. 306. And welds so made are what are called conventional spot welds?

A. They are called conventional spot welds, yes, sir.

Q. 307. Please examine now the pieces of metal that I hand you and state to the Court what they represent, how the plates of

each set were connected together, and by whom they were connected?

A. I have one sample here now that is marked C. S. K.—3.

Q. 308. By stamp?

A. Yes, sir, by stamp, and it consists of two pieces of stock that are approximately 3/32 of an inch in thickness, each. Apparently, I would say, have had a hole drilled through, and the rivet put in place in the hole, and then placed between the electrodes of a spot welding machine and the rivet, as well as the adjoining metal, is spot welded together.

Q. 309. What was the character of the electrodes employed in making that weld?

A. Why, copper point electrodes, such as in an ordinary machine.

(The Court: Is this your own work?

(The Witness: Yes, sir.)

Q. 310. When did you do it?

A. This work was done this year, but I can not say the exact date.

Q. 311. Comparatively recently?

A. Yes, sir.

Q. 312. And with a view of determining what?

A. Whether rivets can be placed in the hole for the rivets, and the surrounding metal welded with the aid of the spot welding machine.

Q. 313. Did you tell the form of the electrodes employed?

A. They were regular flat electrodes.

(Mr. Church: The sample referred to is offered in evidence as Defendant's Exhibit 52A.)

(The Court: Will you let me see that please?)

(Witness hands Exhibit 52A to the Court.)

Q. 314. In like manner describe the others you have in your hand.

A. I will do that. I have another specimen here marked C. S. K.—3, which consists of two plates of approximately 3/32 in thickness, steel, which has been drilled, rivets placed in, and the rivet ends and the adjoining plates joined together with the aid of the spot welding contact machine.

Q. 315. What do you say as to the character of the electrodes used in making that?

A. Those were the regular spot welding electrodes, flat on the end.

(Mr. Church: I offer that in evidence as Defendant's Exhibit 53A.)

(The Witness: I have a third sample here marked S.—4, which is the same grade of material, the same thickness, approximately, which is spot welded, apparently with the regular—)

Q. 316. You say apparently. Do you know?

A. It indicates there were flat contacts here, although with a slight depression, but it was a regular spot welder, cut open through the center.

Q. 317. What was the character of the electrodes in making that?

A. Standard flat contact electrodes.

(The Court: What did you say was the diameter of the electrodes?)

(The Witness: I did not mention.)

Q. 318. What was approximately the diameter of the electrodes used?

A. About ⅜ inch. You only see a small portion of the circle. I have another sample marked R. H. 4, which is of the same material, the same thickness and has had a hole drilled and the rivet extended through the material on both sides, put in position, and headed over with a bar which had a countersinking or recess in the end of it, to form a rivet head.

Q. 319. You regard that as spot welded?

A. That is difficult to say, but the indications from the appearance of the joint is that it is welded at the point of contact between the two plates surrounding the rivet.

(The Court: Let me see that, please.)

(Handed to the Court.)

(Mr. Church: I offer that in evidence as Defendant's Exhibit 55.)

Q. 320. You were present at the Ford plant in this city of Detroit this morning and operated a machine there, a welding machine, in the presence of Judge Killits and of counsel for plaintiff and defendant, were you not?

A. Yes, sir.

Q. 321. What machine was that?

A. That was an electric welding machine, built at the plant of the Warren Electric and Specialty Company in 1900-1901.

Q. 322. Is that the machine about which you have testified in your previous examination?

A. It is.

Q. 323. What parts of that machine, as it now stands, are original parts that were used in 1901?

A. The transformer, the square heads, the main contact, the bed plate of the machine, the movable bars, and the mount on top of the bed plate, and two of the handles arranged with cam rod for operating the movable handles.

Q. 324. Are we to understand the other two handles are not originals, that is to say, were not on the machine as originally constructed in 1901?

A. Yes, sir, they were not original with the machine.

(The Court: What was not original with the machine?)

(The Witness: The two short handles. They were lost after the machine was discontinued in use.)

Q. 325. (By Mr. Church) You were asked to do some work on this machine in the presence of the Court, were you not?

A. Yes, sir.

Q. 326. I hand you a fan and ask you to state what it represents.

A. This is a set of fan blades with their steel center, such as is used on electrically operated desk fans.

Q. 327. How are the blades and center connected?

A. Spot welded together.

Q. 328. When was it done?

A. It was done this morning.

Q. 329. In the presence of the Court?

A. Yes, sir.

Q. 330. And upon what machine?

A. On the original welding machine, built in 1900-1901.

Q. 331. Who operated this machine when this was produced?

A. I did.

(Mr. Church: The fan is offered in evidence as Defendant's Exhibit 56.)

Q. 332. I show you another piece of work and ask you to state what it is.

A. This is a couple of pieces of material stamped out with a die that was used in producing the fan blades.

Q. 333. How are they united?

A. By being spot welded together.

Q. 334. When was it done and by whom?

A. Done this morning by myself.

Q. 335. Upon what machine?

A. On the electric welding machine built in 1900-1901.

Q. 336. Was this also done in the presence of Court and counsel for the plaintiff?

A. It was.

(Mr. Church: It is offered in evidence as Defendant's Exhibit No. 57.)

Q. 337. What is the thickness of the plates in the last exhibit, approximately?

A. I can not tell about the thickness of that material. It is somewhat heavier than the regular standard fan blade. It was a piece of material I had with me, brought over here to demonstrate the welder, and it is approximately 1/16 of an inch, I would say.

Q. 338. Please examine the specimen I now show you and state if you know what it represents.

A. Two pieces of ⅛ inch stock, 1¼ inch wide, spot welded in three places.

Q. 339. When was that work done?

A. That was done this morning.

Q. 340. On what machine?

A. On the same electrical machine manufactured in 1900-01.

Q. 341. In the presence of the Court?

A. Yes, sir.

Q. 342. What was the thickness of this weld?

A. Approximately ⅛ of an inch each.

(Mr. Church: It is offered in evidence as Defendant's Exhibit No. 58.)

Q. 343. I notice in this Defendant's Exhibit 57 the welds are made at a variety of places; there is a line of them, or succession of them, more properly, beginning near the middle of the blade and extending to the edge, and then inwardly and to the opposite edge. Two of the welds appear to have been made at the edge; state whether or not you would characterize all those welds as spot welds?

A. Every one of them is a spot weld.

Q. 344. Was there any difference at all in the method or process of producing those welds?

A. Absolutely none.

(The Court: Let me see that.)

(Witness hands Exhibit 57 to the Court.)

Q. 345. The same steps were taken in the production of each one of those welds, were they not?

A. Yes, sir.

Q. 346. You were requested by Judge Killits to put into the machine out there some pieces of wire with a view of butt welding them?

A. Yes, sir.

Q. 347. Did you do so?

A. I did.

Q. 348. Please examine the samples I now show you and state, if you will, what they represent?

A. They represent the butt welding I did at this time

Q. 349. State what you did in order to change from spot welding to butt welding these rings on that machine this morning?

A. I removed my copper electrodes, or spot welding points, and placed the iron rings in the position formerly held by the spot welding points, that is, between the clamping jaws.

Q. 350. State whether or not you changed at all the distance between the terminals?

A. The clamps?

Q. 351. Yes, the clamps.

A. No, I did not.

Q. 352. Were those clamps in position for spot welding when you used them for butt welding?

A. Yes, they were in the same position as they were when I used them on the spot welding machine this morning.

Q. 353. If you had prepared in advance that machine for butt welding, how differently, if at all, would you have arranged the clamps or terminals?

A. I would have placed the machine so the clamps would have been very much closer together, possibly ¼ or ⅜ of an inch.

When you are butt welding, your metal heats up between the pieces and as soon as it heats up, it loses its strength or stiffness, and there is a tendency of these pieces to fly up, which occurred in this instance, as they had not sufficient strength. Another thing, these rings were not formed up in a ring-forming machine, they are bent up by hand, and were not round, and consequently, I did not get as good an alinement as I should.

Q. 354. You made this emergency application of butt welding at the request of the Court, did you not?

A. I did.

Q. 355. How do those rings you held in your machine and which were butt welded on your machine compare as to size and diameter with the rings that were butt welded on that machine in 1901 for the guards of fans, as you have described?

A. We butt welded rings of approximately this diameter, and other rings from 13½ to 17½ in diameter.

356. In order to do this butt welding as you have described, you substituted for the steel clamps you had there, a copper clamp?

A. No, both were of copper, but I did substitute in the set one that had a groove in there that fitted the rod.

(The Court: Did I understand you to say yesterday that the holes on one side of each clamp was grooved?)

A. It was grooved to fit the ring, to give the alinement of the ring itself.

Q. 357. And they were used in a flat position?

A. We used those rings in a flat position, and then I had the grooves fit inside of the ring. In other words, we used one flat

die and a corner grooved die with the groove to correspond with the ring.

(Mr. Church: I offer this in evidence as Defendant's Exhibit 59.)

(The Court: These rings were inserted in a perpendicular position this morning?

(The Witness: Yes, they were inserted in a perpendicular position.)

(Mr. Church: I have marked these rings respectively Exhibits 59, 60 and 61.)

Q. 358. How much current was used in that machine this morning in your demonstration?

A. That is difficult for me to say, how much current, that is, the quantity, but the voltage was approximately 4½ volts, according to the volt meter reading, which is on the open circuit, and those readings were taken at the time.

(Mr. Church: May I interrupt this examination of this witness in order to prove a book I brought from the Public Library? I should like to have counsel for the other side shorten the process by admitting a copy of the American Electrician of April 1901. It is in the Public Library. It is introduced for the purpose of showing a cut, and I will offer a photostat copy of that as soon as I can get it. I will ask Mr. McBerty a question about it.)

Q. 359. Please examine this copy of the American Electrician of April 1901 which has been brought in from the Public Library of Detroit, and state if you will what the two cuts on the lower right hand page 163 represent?

A. The cut on page 163 marked figure 34, represents the Peerless Desk Fan Motor, apparently one of our high grade or Type A fan motors.

Q. 360. How are the blades connected to the spider of that fan?

A. They are riveted on, three rivets per blade.

Q. 361. Do the rivets plainly show in that cut?

A. Very distinctly.

Q. 362. How about the other cut?

A. On figure 36 marked "Peerless Enclosed Field Fan Motor" the blades do not show any rivets or marks of any kind where they are attached to the center or hub.

Q. 363. How does that last cut referred to correspond with the cuts of the G-2 fans shown in the catalogs of 1901 and 1902 produced yesterday?

A. They compare very closely. I would say they were identical.

Q. 364. Will you read the text descriptive of those fans, if you can find it there on that page.

A. It is a part of a write-up, describing various fans being placed on the market in the spring of 1901. It says:

"The Warren Company"——

(I presume referring to the Warren Electric and Specialty Company)

"also builds a fan motor of the enclosed-field type in two forms, one of which is illustrated in figure 36. The machine illustrated is not adjustable on the pedestal, and runs at only one speed. The 12-inch 110-volt fan runs at 1650 r.p.m. and requires ½ ampere. This fan is known as Type G. The same type of field magnet is used in an adjustable fan known as Type E, in which form the motor is mounted on trunnions for vertical adjustment, and has also a horizontal swivel adjustment. The Type E fan, moreover, has a rheostat and switch in the base, which gives it three running speeds, while the Type G machine has no speed adjustment."

Q. 365. State, if you know, how these to fans came to be illustrated in this publication?

A. The practice in years gone by of the American Electrician was to get in touch with the manufacturers and illustrate and write up the new things they had to offer the public each spring in the line of fan motors, and this is the write-up of the fan motors being put on the market in the spring of 1901.

Q. 366. Was that a paid advertisement?

A. It was not.

Q. 367. How happened it to get into this book or publication?

A. This would be the result of a request from the American Electrician to the Warren Electric and Specialty Company to advise them and to supply them with cuts and information describing and illustrating their new production.

(Mr. Church: It is consented that a photostat copy of page 163 of the American Electrician of April, 1901, may be offered in evidence in place of the publication itself; the same to be marked Defendant's Exhibit No. 62.)

(The Court: Is this or is it not the same cut—I am referring to figure 36, page 163—that is used as fan G-2 in your catalog of 1901?)

(The Witness: As near as I can figure, it is the same cut.)

(*McBerty's testimony continued, page* 315.)

(Mr. Church: May it please your Honor, I should like personally to again look at the exhibits which were produced yesterday, if I may.)

(The Court: Certainly.) (handing exhibit to counsel.)

(Mr. Church: It is not necessary to show them to the witness, but I ask counsel to let me see those exhibits that are supposed to be connected with the affidavits.)

(Mr. Stackpole: Oh, yes.)

(Mr. Church: You have no objection to my bringing them over to the light?)

(Mr. Stackpole: Oh, no, no.)

(Recess to 1:30 P. M.)

AFTERNOON SESSION.

EDWARD B. CRAFT.

EDWARD B. CRAFT, after being duly sworn on behalf of the defendant, testified as follows:

Direct examination by MR. CHURCH:

Question 1. Please state your name, age, residence and occupation.

Answer. Edward B. Craft: 37 years old; assistant chief engineer of the Western Electric Company, New York.

Q. 2. Where is your home, Major Craft?

A. Afton, N. J.

Q. 3. How long have you been with the Western Electric Company?

A. Since January 6, 1902.

Q. 4. Will you give an idea of the number of engineers or the corps of engineers under you sir?

A. The number varies; there are a total of about 2,000 engineers in the department, about half of which report to me.

Q. 5. And the other half report to whom?

A. The second assistant chief engineer.

Q. 6. In what department do you preside, and over what department does he preside?

A. The work is divided about equally between the research department, which is in charge of the other gentleman, and engineering and designing under my charge, which is the development of experimental work in connection with the department of telephone apparatus.

Q. 7. You have been in the army, have you not, sir?

A. Yes, sir.

Q. 8. How recently have you returned from abroad?

A. I returned September 22nd.

Q. 9. What were your duties abroad?

A. I was employed during the last months by the Navy Department in connection with consulting work in the Radio Department.

Q. 10. Where were you born?

A. Born in Ohio.

Q. 11. Do you know F. P. McBerty, who has given testimony here today?

A. I do.

Q. 12. How long have you known him?

A. About 20 or 22 years.

Q. 13. Were you ever employed by the Warren Electric and specialty Company of Warren, Ohio?

A. I was.

Q. 14. Durihg what period did that employment cover?

A. At the time I was attending high school in Warren; I was employed during the summer vacations there and from 1898 until the first of 1902 I was employed regularly by that company.

Q. 15. And where did you go and gain employment after having left the Warren Electric and Specialty Company?

A. I left the Warren Electric and Specialty Company to go with the Western Electric Company at Chicago.

Q. 16. Have you been connected with the Western Electric Company ever since?

A. Ever since.

Q. 17. When were you transferred to New York?

A. In the fall of 1907.

Q. 18. Have you any knowledge of the use of an electric welding machine at the Warren Electric and Specialty Company?

A. I have, yes, sir.

Q. 19. During what period did you obtain that knowledge?

A. During the latter part of 1900 and during the year 1901.

Q. 20. Where did you gain your first experience of electric welding?

A. My first experience in connection with electric welding was brought about by a visit I made to the Pneumatic Wheel Company of Freehold, N. J., who had purchased of the Warren Electric and Specialty Company a welding transformer, a boosting transformer, being used by this company in the manufacture of a steel wheel, and through some controversy in connection with the operation of the boosting transformer, I was sent down there to ascertain what the trouble was, and at that time I saw them welding steel wheel arms by the electric butt process, and became familiar with their operation.

Q. 21. That was your first introducction to electric welding?

A. Yes, sir.

Q. 22. And that was butt welding?

A. Yes, sir.

Q. 23. State, if you know, how it came about that an electric welder was purchased at the factory of the Warren Electric and Specialty Company when you came back?

A. At that time, the latter part of 1900, Mr. McBerty and I practically constituted the technical staff of the Warren Electric and Specialty Company, and I told Mr. McBerty about what I had learned in regard to electric welding, and at that particular time we were engaged in the development of this form of fan motor, desk wheel type of fan motor, and we were going to use steel instead of brass wherever we could for such as fan guards, and fan blades, and it occurred to us there was a possibility of employing the butt welding process in the manufacture of these fans, and we proceeded to make up a rather crude form of a welding device and using it in welding up these parts.

Q. 24. What were the parts you designed to be welded by that machine?

A. Our first machine had to do with the employment of this machine in butt welding the rings which go to make up the assembly of the fan guard. Later on Mr. McBerty did some experimenting with the same machine in the spot welding of the fan blades to the hub of the fan wheel. I personally did not do any of that spot welding work.

Q. 25. What did you see, if anything, in the way of spot welded work done by Mr. McBerty?

A. Mr. McBerty showed me samples of the work he had done with this machine, and I remember of his particularly showing me one of these steel blades and spider and showing me how strong it was, and what a good substitute it was for the ordinary riveting process.

Q. 26. State whether or not that was a complete fan blade?

A. That particular one upon which he demonstrated the strength of construction was only a partially assembled fan. I saw others, however, which were completely assembled, the blades attached to the central spider.

Q. 27. How, if at all, were any of these fan blades tested for strength of union?

A. This sample I have previously described, the test for strength was made by attempting to pull the blade loose from the hub with a pair of pliers, and its strength was indicated by the fact the blade pulled loose from the hub and left a portion of the metal attached to the hub.

Q. 28. How many of these completed fans, spot welded, as you have described, did you see at that time?

A. I saw a number of them, I am not able to say how many, but several of the completed fans, and completed motors.

Q. 29. Were the fans attached as a part of the motor, or were they separated from it?

A. I saw them in an unassembled state and completely assembled.

Q. 30. Will you please describe as accurately as you may the appearance of these blades that were connected to the centers or spiders by welding? What did they look like?

A. The principal difference, the distinguishing difference between those fans and the ordinary standard output which had been used theretofore, and those fastened together by means of rivets was the fact there were no rivet heads on the surface of the fan blades. That is, these spiders, or centers as you have been referring to them, looked as though it was steel punching from sheet metal, the radial arms of the spider turned at a slight angle to the fan.

Q. 31. Do you recall whether those spiders had perforations in the arms?

A. I don't recall whether these particular ones that were welded had perforations in the arms or not.

Q. 32. Do you recall whether these fan blades you saw had perforations in them?

A. They did not.

Q. 33. They were plain?

A. They were plain, without perforations.

Q. 34. Do you recall how many weldings were made between each fan blade and each spider?

A. I can not recall the exact number; there were several, but how many, I would not attempt to say.

Q. 35. Whereabouts on the blades or the spiders were they placed with reference to the edges?

A. They were in the central portion of the blade, necessarily so, because the spider itself is narrow.

Q. 36. When did you say you left the Warren Electric and Specialty Company?

A. On January 4, 1902.

Q. 37. Are we to understand you never afterwards were employed by that company?

A. I was not.

Q. 38. Were you ever employed there afterwards, in Warren?

A. No, sir; I have only visited it once, as a matter of fact.

Q. 39. Do you recall what transformer was used in the construction of that welding machine used at Warren in 1901, as you say?

A. It was a transformer constructed there in the factory. At that time the Warren Electric and Specialty Company were also making a transformer and this particular one was designed and manufactured in the shop.

Q. 40. Did you have any part in the assembling or connecting up of this welding machine of which you have spoken?

A. Yes, I personally connected the thing up with the transformer and made the first weld with it.

Q. 41. And the welds you made were with the rings?

A. Yes, sir.

Q. 42. Do I understand that you yourself did not do any welding of the blades to the fans at that time?

A. I did not.

Q. 43. You understand what spot welding is?

A. I do.

Q. 44. Were the welds that you saw on the blades of these fans, that were completed, as you said, were they what you would call spot welds today?

A. Yes, sir, as I understand the term.

Q. 45. What is your notion of spot welds? I guess we had better get that.

A. My understanding of spot welds is that the two pieces of metal to be welded are joined together at a point by electric welding, surrounded by non-welded material.

Q. 46. How are those spots made?

A. By copper electrodes pressed on either side with a heavy current passing between them.

Q. 47. Were or were not any such electrodes used in that machine of Mr. McBerty's?

A. Yes, sir. There were pointed or rounded nosed copper electrodes.

Q. 48. Were you present at the Ford plant here today when Mr. McBerty did some welding on the welding machine in the presence of the Court, Judge Killits?

A. Yes, sir.

Q. 49. Did you recognize that machine as one you had before seen?

A. To all appearances, it was the identical machine that I wired up in Warren, Ohio.

Q. 50. Will you please examine this machine here in court and tell the Court if you can identify this machine?

(Witness leaves the stand and is shown Defendant's Exhibit B, McBerty machine.)

A. This is the machine that was assembled and wired at the time described.

Q. 51. What parts of this machine do you recognize as original?

A. I recognize the lower frame members and the movable arms attached to them which were designed to be brought together by means of cam levers; also, the clamping jaws or electrodes, they are really jaws here; attached to these were members which were also adapted to clamp the work to be welded by means of the cam levers. I recognize the transformer that is associated with it.

Q. 52. You saw Mr. McBerty do some welding at the Ford plant this morning, did you not?

A. I did, yes, sir.

Q. 53. What did you see him do?

A. I saw him do some spot welding of fan blades to the fan hubs on this machine, these blades and hubs being similar in appearance to those I saw in Warren.

Q. 54. Did you see him do any other kind of welding? If so, what?

A. I saw him weld together two sheets of metal, I think they were fan blades themselves.

Q. 55. Did you see him do any other kind of welding by means of that machine?

A. Yes, sir, the welding of the steel rings, similar to the type of ring that was employed in the fan guards in the early days.

Q. 56. Had you had experience in the use of that machine in the welding of fan guards by a butt welding process?

A. Yes, I have.

Q. 57. Have you any fault to find with the performance of that machine when operated by Mr. McBerty for the butt welding of those pieces he welded there?

A. You mean this morning?

Q. 58. This morning.

A. They did not appear to me to be satisfactory in that obviously the jaws or the ring was not the proper form to fit in the clamping jaws, and it interfered with their alinement of the joints. Furthermore, it appeared the current was not properly adjusted to produce the proper sort of weld in that particular piece.

Q. 59. Does it require a different current to butt weld from that which is employed in spot welding? If there is any, please state it.

A. Of course, the value of the potential and current required varies with the character of the work itself, the amount of surface to be welded, etc.

Q. 60. Have you any doubt whether you could employ that machine for either butt welding or spot welding?

A. No doubt whatever.

Q. 61. I understand that while you did not use this machine in 1901 for spot welding, you did personally use it for butt welding of wires?

A. Yes, sir, the very first construction was made with these steel rings and they were entirely satisfactory.

Cross-examination by MR. STACKPOLE:

X-Q. 62. What, if anything, did you have to do personally with the making of the transformer with that wheel company of New Jersey?

A. Nothing.

X-Q. 63. Do you know how many turns were in the primary?

A. I do not.

X-Q. 64. Do you know how many turns were in the secondary?

A. No.

X-Q. 65. Do you know what voltage it was intended to be used with?

A. I probably did at the time, but I don't recall now.

X-Q. 66. Was the transformer in the same condition when it came back to the Warren Electric & Specialty Company as it was when it left there?

A. You mean the transformer that was sold to this New Jersey company?

X-Q. 67. Yes, sir.

A. I don't know. I didn't see it when it came back.

X-Q. 68. You did not see it when it came back?

A. No. That was a commercial type of transformer.

X-Q. 69. One of the regular type?

A. No, it was made for this particular purpose, but it was a commercial transaction; it wasn't experimental.

X-Q. 70. Is the transformer of this machine the one that went to Freehold?

A. Oh, no, no. This transformer was made up after that transaction.

X-Q. 71. When was that?

A. That was the latter part of 1900. The experimental work was carried on the latter part of 1900, and early part of 1901.

X-Q. 72. Do you recall the transformer came back from Freehold?

A. No, I do not. It was to come back, because it was not used down there. That is, the booster transformer, not the welding transformer.

X-Q. 73. I am talking about the welding transformer. Did that come back from Freehold?

A. No, that was sold.

X-Q. 74. No transformer came back from Freehold?

A. Not that I know of.

X-Q. 75. When did you go to Freehold to see this machine?

A. I can not recall the exact date, but it was the latter part of 1900, either the fall or early winter of 1900.

X-Q. 76. How does this transformer differ from the one that was in Freehold?

A. It is considerably smaller, for one thing.

X-Q. 77. I mean by this transformer the one that is in the box here.

A. This one is much smaller than the one in Freehold.

X-Q. 78. You mean smaller in size or capacity?

A. Both.

X-Q. 79. What is the number of primary turns in the transformer of this present machine?

A. I don't know.

X-Q. 80. Do you know the number of secondary turns?

A. I do not.

X-Q. 81. Do you know the proper voltage to use with it?

A. I don't know. That is determined by experimnet.

X-Q. 82. Do you know what was the voltage used with this machine in the Warren Electric & Specialty Company's factory in welding the fan guard rings?

A. Which voltage do you mean, the primary or secondary?

X-Q. 83. The primary.

A. As I recall—I am not sure—it was about 250 volts. It was a low voltage primary.

X-Q. 84. Is that the same current that was used for lighting?

A. No, we had a special machine for that purpose.

X-Q. 85. Did they use the same current at that time that was used for lighting?

A. I don't think this same machine was used for lighting.

X-Q. 86. I mean, was the current used for lighting that was used for this machine?

A. I don't think the same current that was employed for welding was employed for lighting, although I am not sure.

X-Q. 87. Did you see or did you not see him do spot welding with this machine?

A. I did not see him do spot welding, no.

X-Q. 88. Was it employed regularly in spot welding?

A. Of my own knowledge, I don't know the extent to which this was employed, and my own personal knowledge only extends to the comparatively few samples that were shown me by Mr. McBerty, and my seeing the machine with the spot welding electrodes attached to it for this work.

X-Q. 89. You saw the machine this morning; did you notice the spot welding electrodes?

A. I did.

X-Q. 90. Were they identical with the ones used in 1901 that you saw?

A. They were identical in appearance; whether they are the identical electrodes, I could not say.

X-Q. 91. Did the electrodes used in 1901 have the shoulder on them that these electrodes had this morning?

A. That I could not say.

X-Q. 92. How many complete four-bladed fans and spiders did Mr. McBerty show you?

A. Well, I could not say exactly. I should imagine they were in the neighborhood of half a dozen, as I recall it. Several of them. I would not attempt to give the exact number.

X-Q. 93. No more than half a dozen?

A. I could not say that. That did not necessarily include all that was made, but the ones I saw.

X-Q. 94. I didn't understand whether you said you saw these assembled or complete fans or not?

A. Yes, sir. I saw them in an unassembled and assembled form, complete fans.

X-Q. 95. You didn't see Mr. McBerty do the spot welding of these fans?

A. No, I don't recall that I saw him exactly do the work.

X-Q. 96. Do you recall the means that were employed for separating the base plates of this spot welding device?

A. By base plates you mean the two stationary members to which the terminals are connected?

X-Q. 97. Yes.

A. As I recall it, they were insulated on the wooden bench by strips of fibre.

X-Q. 98. Was the fibre between the base plate and the bench?

A. As I recall it, yes, sir, to protect the wooden bench.

X-Q. 99. Was there any fibre between the plates themselves?

A. I would not attempt to say just exactly the detailed construction of that machine, but I do recall that wherever insulation was necessary to be employed, fibre was employed. I don't recall the exact detailed construction, it is 17 or 18 years ago.

X-Q. 100. Do you recall a visit made to you by Mr. Thomas Howe?

A. About what time was that?

X-Q. 101. About the year 1913.

A. I don't recall, not the name. I don't recall it. I would have to have something more definite, I think, to bring it back.

X-Q. 102. Mr. Howe is the gentleman here; do you recall him?

A. He visited me in connection with welding matters?

(Mr. Howe: Yes, sir.)

A. I have a very hazy recollection now of having a visit from somebody along about that time. In 1913 I was in New York.

X-Q. 103. At that time do you recall whether he questioned you about these matters that occurred in Warren back in 1901?

A. I have a very hazy recollection of it. It may come back to me now that it is mentioned, but I had entirely forgotten this. Let us see. In 1913. Somebody talked to me about this matter in 1913. Whether it was Mr. Howe or not, I can not recall.

X-Q. 104. Between 1901 and 1913 had any one talked to you?

A. No.

X-Q. 105. Mr. Howe, you think, talked to you perhaps in 1913; who else talked to you since about this?

A. Mr. Pattison has talked to me about it.

X-Q. 106. Mr. McBerty?

A. Mr. McBerty has written me, and he was in my office one day, too.

X-Q. 107. When did Mr. Pattison talk to you about it?

A. I don't recall the exact date. I don't even recall whether it was before or after the war. It is not many years ago. That is about as definite as I could state it.

X-Q. 108. Did you tell him the same thing you told Mr. Howe?

A. If I discussed, and I did discuss the welding proposition with him, I undoubtedly told him the same thing I did anybody else.

X-Q. 109. Did he show you the samples at the time he said Mr. McBerty had made?

A. Mr. Pattison?

X-Q. 110. Yes.

A. I don't recall that he did, no.

X-Q. 111. Did Mr. McBerty show you any samples?

A. No.

X-Q. 112. You discussed this with Mr. McBerty?

A. Yes, sir.

X-Q. 113. When was that?

A. It was, I think, probably nearer 1913 than the present date. I think it was in connection with the 1913 history of this war.

X-Q. 114. About the same time Mr. Howe came to see you?

A. Some time along about that time. I know this whole thing was in the air at that time.

X-Q. 115. And you gave what information you had up to Mr. McBerty?

A. Yes, sir.

X-Q. 116. And how recently have you gone over this with Mr. McBerty?

A. I have had no conversation with Mr. McBerty, other than a few casual words at the plant this morning. I had not seen him before.

X-Q. 117. Not since 1913?

A. No.

X-Q. 118. Did you give an affidavit to Mr. McBerty, or to Mr. Howe, or anybody in 1913?

A. I gave an affidavit at the request of Mr. McBerty's people, whether it was Mr. Howe, I don't recall, but I gave an affidavit.

X-Q. 119. Do you know who prepared that affidavit for you? Or did you prepare it yourself?

A. I prepared it myself, as I recall it. It may have been finally put in legal language by a lawyer, but I wrote the subject matter of it.

X-Q. 120. To whom was that affidavit given?

A. I think I sent that by mail to Mr. McBerty. I would have to refer to my own files for that. I know I received an acknowledgment from him in Warren.

X-Q. 121. What year was that in?

A. I can not tell you exactly, but as I say, as I recall it, it was in the period along 1913 or 1914 possibly. My best judgment is that was the date. I could check it up for you exactly, of course.

X-Q. 122. It went rather to Mr. McBerty than to Mr. Howe?

A. I am quite sure it went to Mr. McBerty. I know that I received a letter of acknowlegment from him.

X-Q. 123. Did Mr. McBerty write you concerning these matters which you testified about that occurred in 1901?

A. Yes, sir; yes, sir.

X-Q. 124. Have you those letters?

A. I have not them with me, no.

X-Q. 125. Can you produce them? Are you willing to send them to counsel or the Court?

A. I can produce such letters as I have in my office in New York, yes, sir.

X-Q. 126. I should like to have you do so.

(Mr. Fish: Be specific so that he will know what you mean.)

(Mr. Stackpole: I want the letters that you received from Mr. McBerty asking you about this welding machine used in 1901. Will you send to the clerk of this court all the letters from Mr. McBerty and your replies thereto, relating to the use of the 1901 welding machine used at the Warren Electric & Specialty Company's factory?)

A. Upon proper order, I will do that.

X-Q. 127. Upon proper order?

A. Yes, sir.

(Mr. Stackpole: Will your Honor ask the witness to do that?)

(The Court: I see no objection to that.)

(Mr. Church: None whatever; on condition, of course, they are made a part of the record when they come in.)

(The Court: Yes, of course, they must be made a part of the record.)

X-Q. 128. (By Mr. Stackpole.) Did you receive other letters from Mr. McBerty in a later year than 1913?

A. Not that I recall, no, but I would have to go through my files to be certain of that.

X-Q. 129. Did you receive any photographs from Mr. McBerty?

A. In connection with the initial affidavit they sent me photographs of this machine which I returned.

X-Q. 130. Did they send you any samples of the work done, any spot welding samples?

A. No.

X-Q. 131. Was the transformer that is now in the machine one of a lot of transformers that was the usual output of the Warren Electric & Specialty Company, or was it a special transformer?

A. As I recall it, this transformer was made up specially for this job. That is my recollection. I did not design the transformer myself.

X-Q. 132. Did you design the transformer that went to Freehold?

A. No.

X-Q. 133. And that transformer did not come back?

A. No, not to my knowledge, it did not; it was in operation when I last saw it in Freehold.

X-Q. 134. What was the trouble with the transformer that was used at Freehold, the welding transformer, I mean?

A. Nothing at all; it was entirely satisfactory.

X-Q. 135. Was there ever another transformer sent to Freehold?

A. Not a welding transformer. A boosting transformer was sent to the company.

X-Q. 136. What is a boosting transformer?

A. It is a transformer for either increasing or decreasing the voltage in the secondary side, which is the voltage regulating the transformer.

X-Q. 137. Isn't that the function of any transformer, to increase or decrease the voltage? I don't get the distinction that you make between a welding transformer and a boosting transformer.

A. This simply was employed to regulate; it might have been the primary voltage, I think it was, to regulate the primary voltage by means of steps of varying ratios. It was a regulating device, and was not used because the manufacturer found he could regulate from the alternating or direct.

X-Q. 138. So far you know, only one welding transformer was sent to the Freehold company?

A. Yes, sir, making that distinction between welding and boosting transformers, yes, sir.

X-Q. 139. How many boosting transformers were sent?

A. Only one.

X-Q. 140. And only one welding transformer?

A. Yes, sir.

X-Q. 141. They were together?

A. Yes, sir.

X-Q. 142. Neither of them came back?

A. No, sir.

X-Q. 143. And they were both satisfactory?

A. They were both satisfactory, except the manufacturer did not want to pay for the booster because he did not need it.

X-Q. 144. He did not send it back?

A. Not that I know of, no.

X-Q. 145. Do you know the number of turns in the primary of this transformer, of the machine you witnessed the operation of this morning?

A. No, I told you before I did not know the number of turns.

X-Q. 146. Do you know the voltage that was obtained across the terminals of the welding device this morning?

A. Yes, I observed 4½ volts.

X-Q. 147. Is that the same voltage used with the Warren Electric & Specialty Company?

A. As I recall it, it ran between 4 and 6 volts, depending on what you are trying to do with it.

X-Q. 148. You said, I believe, that the voltage used this morning was too heavy for the butt welding.

A. I did not say it was too heavy; I did not think it was properly adjusted for that particular work. It may have been too heavy, or it may have been too light.

X-Q. 149. Would you say that was the same current that had been used for the butt welding on this machine in 1901?

A. That I don't know.

X-Q. 150. Do you know what would be a proper voltage with the size of wires that were used this morning on that machine?

A. No, I would not attempt to say that, either.

X-Q. 151. You don't know whether it would be only one, or five volts?

A. I should say it would be somewhere between those two figures.

X-Q. 152. You have referred to some fan blades that were spot welded to the spiders, how were the blades usually fastened to the spiders in this type of fan?

A. Rivets, the same as in the standard, the same as the standard fans made previous to that time.

X-Q. 153. And those fan blades were punched for rivet holes?

A. You are referring now to the regular type?

X-Q. 154. Yes, sir.

A. When they were riveted, they were punched.

X-Q. 155. Were they punched at the same time they were cut?

A. That, of course, I don't know.

X-Q. 156. Were the spiders punched at the same time they were cut?

A. That I could not say either. If I were to judge, I presume they were a separate operation. That kind of operation usually is separate, blanketing and perforating, as they call it, but I am not sure about this particular case.

X-Q. 157. How many of this type of fan were made in 1901?

A. That I could not say.

X-Q. 158. Were there several thousand?

A. I should judge so. I know there were large numbers being manufactured at that time.

X-Q. 159. Were there as many as three thousand, would you say?

A. That I would not attempt to say; I don't know.

X-Q 160. Then there were, with the exception of those few that were spot welded, all the others riveted in the blades and spiders?

A. As I recall it, yes, sir. The standard method of practice.

X-Q. 161. That was the standard regular practice?

A. Yes, sir.

X-Q. 162. And the fan guard rings were butt welded?

A. Yes, sir.

X-Q. 163. Was the diameter of the wires of the fan guard rings the same as the diameter of the wire of the rings that you saw welded this morning?

A. I don't know as I can say definitely, but I recall that the actual fan guard rings were larger in diameter. It appeared the outside rings were 18 to 24 inches in diameter.

X-Q. 164. I am referring to the diameter of the wire itself.

A. The diameter of the spoke of the ring from which the ring was made, as I recall it, was heavier.

X-Q. 165. Were the front guards and back guards of the same weight?

A. I am not sure about that.

X-Q. 166. Was there any other transformer than this one used in the fan motor department at Warren?

A. Well, I don't know. I don't know whether a transformer was used there. I am not sure.

X-Q. 167. Was there any other operation that required a transformer of this character?

A. Not that I know of, but it would not necessarily follow there were no others, but not to my knowledge.

X-Q. 168. Was there in operation prior to that time such a transformer?

A. No. At that time, as I recall it, all the motors were direct current motors, and I don't recall of any alternating current being used in connection with the manufacture of the motors.

X-Q. 169. All the motors, you say, were direct current motors? What motors?

A. Motors that were being manufactured; although at that time if there had been an alternating current, they would have used them for testing.

X-Q. 170. In connection with this 1901 machine and the fan blades, and so forth, have you talked with anybody else besides Mr. Pattison, Mr. McBerty and Mr. Howe?

A. I talked with Mr. Church about my coming up here.

X-Q. 171. Did you talk with Mr. Smith?

A. Mr. Smith?

(Mr. Church: What Smith?)

X-Q. 172. A Mr. Smith.

A. Not that I recall.

X-Q. 173. When the transformer was in use, where was it located, with reference to the welding device?

A. As I recall it, it was on the floor underneath the bench to which the welding jaws were attached, right on the floor, underneath the bench.

X-Q. 174. And the welding device was attached to the bench?

A. Yes, sir.

X-Q. 175. And you recognize that board as part of the bench?

A. No, I could not say that was a part of the bench. It looks something like it, however.

X-Q. 176. Well, all benches look more or less alike.

A. Yes, sir, they do.

X. Q. 177. There are holes through these flanges of the bottom blades of this McBerty machine near their front ends. Do you recall that hole?

A. May I look at that? No, I don't remember that. It may have been there. I don't recall it.

X-Q. 178. Do you recall the width with which the two base plates were separated from one another?

A. Not exactly. They were not far apart.

X-Q. 179. Are they apart further now, or not so far apart?

A. I should think they were in the same order then as that shown here.

X-Q. 180. How near did you come to that? Did you come within ⅛ inch?

A. I don't believe I could trust my memory to an ⅛ of an inch.

X-Q. 181. You say you don't recall the fibres that are in there now?

A. I have not a picture in mind of exactly how the fibres looked, for that base; I don't know.

X-Q. 182. We have two pieces of red fibre and one gray fibre. Does that help your memory?

A. No, it may have been well changed a dozen times.

X-Q. 183. Do you recall the use of anything other than the electrodes that might have been used for spot welding?

A. No, no; that is the only thing I recall.

X-Q. 184. Do you recall any attempt to weld copper wires?

A. I don't recall. I can not bring to mind now a trial of that sort, although we did do almost all sorts of experimenting on that machine. We tried most everything.

X-Q. 185. Do you regard this matter of welding blades to spiders by spot welds as experimenting or not?

A. Yes, most distinctly experimenting.

X-Q. 186. And after they had made four or five of these blades, the operation was given up?

A. I understand that it was not adopted as the regular manufacturing process.

X-Q. 187. Do you know the reason why?

A. No, I don't. I was not connected with the actual manufacturing of the fan motors.

X-Q. 188. Did you know Mr. Gillmer at the time?

A. Yes, sir, very well.

X-Q. 189. What other experiments did Mr. McBerty make with that machine?

A. These were the only ones that I recall.

X-Q. 190. Would he do these experiments in the regular working time or during the lunch hour?

A. Oh, no, he did it in the regular working time. He was the superintendent at that time of the fan motor factory and that was part of his work. He was the principal part of the technical staff.

X-Q. 191. He did that in the regular time?

A. As I remember it. I don't remember any specific instance where it was done outside of hours. It was a part of our regular work.

X-Q. 192. Of course, the butt welding of the fan guard rings was regular work?

A. After it became a regular commercial operation.

X-Q. 193. Do you remember what time in the year that became a regular commercial operation?

A. No, I don't, but it must have been very early, because it was the custom to start the season's product very early in the year.

X-Q. 194. How early?

A. Of course, some parts are made all during the winter previous, and then we start assembling in the early spring, and anticipate the orders coming in.

X-Q. 195. They would not do any assembling until the spring?

A. Oh, not necessarily.

X-Q. 196. What do you mean by spring, March, February or April?

A. It all depends upon what part of the country they are going to, but the fan motor business, as I remember, became very active shortly after the first of the year.

X-Q. 197. You mean the manufacture of fans?

A. The production of fans.

X-Q. 198. Ready for the summer season?

A. Of course, the summer season varies with the geographical location.

X-Q. 199. Have you any means of identifying or recalling these spot welded blades and spiders, except your own memory?

A. No.

X-Q. 200. Purely unaided memory?

A. Yes, sir.

X-Q. 201. In welding the fan guard rings, what kind of clamping devices were employed on this machine? I refer to the movable copper clamps.

A. They were flat copper jaws curved, with a curved face, and also grooves to conform to the contour of the wire from which the ring was made, so as to clamp it over a considerable area of wire.

X-Q. 202. The machine is not equipped now with that form of clamps?

A. No, the particular jaws on that machine are not the ones that were used on the large rings.

X-Q. 203. Are the jaws on the machine now original parts?

A. I don't recognize the two top copper jaws, broad copper jaws.

X-Q. 204. The movable copper jaws?

A. No, the ones that I recall, the ring laid horizontal with the machine.

X-Q. 205. And this morning they welded the ring in a vertical position?

A. Yes, sir.

X-Q. 206. Do you recollect that operation?

A. This morning I did, but I didn't recall it previously.

X-Q. 207. The rings were not arranged vertically in the ordinary practice in 1901?

A. Not that I recall; it may have been the small rings were welded vertically, but the only thing I have a vivid recollection of is the large ring being welded in a horizontal position. That I recall very distinctly.

X-Q. 208. Do you recall whether in the actual manufacture of these fans, the blades would be all made at one time, stamped and punched?

A. You mean—

X-Q. 209. At that time, in 1901.

A. What do you mean by "at one time"?

X-Q. 210. Would they make a few one day, some the next day, or would they make the whole lot and finish them up?

A. I don't recall, I am sure.

X-Q. 211. Look at this McBerty machine here once more. Can you state whether the fan device projects over the table to the same extent now as it did in 1901?

A. It looks very much the same.

X-Q. 212. Can you be more definite about it than that?

A. I can not.

X-Q. 213. You can not say definitely whether the projection of the fan devices were the same now as then?

A. No, I could not say from looking at this that they are the same now as they were then.

Q. 214. Where did you see the spot welded blades and spiders?

A. In the factory of the Warren Electric and Specialty Company.

X-Q. 215. In the fan department room?

A. I think it was in the tool room. We had a machine shop where we made dies, and as I recall it, the first time I saw the actual parts was in this tool room.

X-Q. 216. He had some samples there. Is that it?

A. Yes, sir.

X-Q. 217. And showed them to you there?

A. Yes, sir, and later on I saw the other samples in the more completed state.

X-Q. 218. What do you mean by "more completed state"?

A. More completed, assembled fan motors to the wheel; the first time I saw it was the hub with one blade attached to it.

X-Q. 219. And the next time you saw it what was it?

A. I could not say exactly when I saw it the next time, but at subsequent times.

(The Court: You saw the complete fan?)

A. Yes, sir; they were operating the fans.

X-Q. 220. Where were they?

A. They were standing on the bench.

X-Q. 221. The complete fan?

A. Yes, sir, ready to ship, as well as parts not assembled.

(Mr. Stackpole: Do you remember any photographs taken of them?)

A. No, I don't.

X-Q. 222. Do you recollect the use of any jig or holding device for holding the blades with reference to the arms of the spider such as were used this morning?

A. No, sir.

X-Q. 223. Did you see all those assembled fans at the same time?

A. As I recall the assembled fans, there were a few of them setting on the bench, along with others of a similar type. I should say I did see them all at one time.

X-Q. 224. You mean half a dozen?

A. Something like that, half a dozen or more.

X-Q. 225. Did you see the spiders and blades not in assembled form, did you see them at the same time you saw the assembled fans?

A. No, that was before. You mean the completed fan wheel?

X-Q. 226. Yes.

A. No, that was before. I saw that in connection with my observation of the work which Mr. McBerty was doing, as he would show me what was going on, knowing my interest in those things.

X-Q. 227. Now, in those completed fans that had these spot welded blades and spiders, were the rivet holes punched in either the spider or the blades?

A. You could not see them. I am not sure there were rivet holes in the spiders. You could not see them in the front.

X-Q. 228. You only saw the front?

A. I only saw the front; there were no rivets in the blades.

X-Q. 229. And they were covered with enamel?

A. They were japanned.

X-Q. 230. Suppose the rivet heads were countersunk and then japanned. Do you think you would have seen them?

A. Probably under those circumstances—

X-Q. 231. No. Answer that question.

A. I would probably have seen them if they had not been covered sufficiently.

X-Q. 232. If they had been japanned sufficiently you would not have seen them?

A. No.

X-Q. 233. So that of your own knowledge, do you know whether those fan blades were spot welded, with those spiders? Did you see the work done?

A. I did not see the work done; therefore, to that extent, it was not of my own knowledge.

X-Q. 233. So it is an inference on your part that they were spot welded?

A. To a certain extent, yes, sir.

X-Q. 234. Mr. McBerty showed you a certain number of the four bladed pieces with the fan blades connected to the spiders.

A. Yes, sir, I saw some of those assembled in various stages of completion.

X-Q. 235. Were the rivet holes in the spiders?

A. That I don't recall.

X-Q. 236. Were the rivet holes in the blades?

A. I am sure they were not.

X-Q. 237. If the rivet holes had been in the spiders or blades of the completed japanned fans that you say you have reference to, would the others have been visible?

A. I certainly would have recalled them. They would have been visible if they were there.

(The Court: In both blade and spider?)

(The Witness: Yes, sir.)

X-Q. 238. (By Mr. Stackpole) And you saw no rivet holes at all?

A. I did not see any rivet holes, but that does not mean they might not have been present in the spider and covered up by the blade.

X-Q. 239. You only saw the front side?

A. I simply looked at them as a finished thing, representing a new type of fan.

X-Q. 240. And that was showed you by Mr. McBerty?

A. Yes, sir.

X-Q. 241. And that was some time subsequent to the time he showed you these unassembled fan blades and spiders?

A. Yes, sir. He was just following the progress of his development work.

X-Q. 242. Can you remember what time in the year 1901 you saw these assembled fans?

A. No, I could not state accurately the date.

X-Q. 243. You think it was after, say, the first of March?

A. No, I should say it was probably before the first of March or shortly after. About April I was transferred from the work I was doing into the lamp factory of the organization, and my connection with this so-called engineering work so that it must have been some one of the first two or three months of the year.

X-Q. 244. This morning you saw a welded fan blade and spider; do you recall whether or not the fan blade and spider which you say you saw spot welded in 1901 were of this size?

A. As I recall, it was about that same size.

X-Q. 245. About a 12-inch fan?

A. I guess that is what it is, 10 or 12 inches.

X-Q. 246. It was similar in dimensions to that?

A. Yes, sir.

X-Q. 247. So that there is quite a marked difference between those and a 16-inch fan?

A. Yes, sir, that is the small size, as I understand.

X-Q. 248. When was the transformer of these particular machines built?

A. It was built some time after my return from the Freehold trip. It was built in connection with the development of this particular machine, but the exact date it was started I could not say.

X-Q. 249. Did you assist in designing it?

A. No, I simply gave the requirements, what the requirements would be.

X-Q. 250. What were those requirements?

A. We knew it would make a low voltage. It was rather a cut and dried proposition.

X-Q. 251. You tried first the welding of fan guard rings?

A. Yes, sir, I tried it myself personally.

X-Q. 252. Did you try welding any members than guard rings?

A. I don't recall it. We might have tried it, but probably were not very successful.

X-Q. 253. What do you mean by saying you might have tried it? Do you recollect trying it?

A. No, I don't recall trying it.

X-Q. 254. Do you recall Mr. McBerty trying it?

A. No.

X-Q. 255. In the letters which Mr. McBerty sent you, were there any photographs of those machines taken? I forget whether I asked you that before or not.

A. Yes, sir, there were photographs of the old machine, the original machine.

X-Q. 256. Did they show any fan blades or jaws, or anything of that sort?

A. Not that I recall. I returned the photographs and do not recall what they showed.

X-Q. 257. In those letters did Mr. McBerty describe what he did?

A. Yes, sir.
X-Q. 258. That is all.

(Mr. Church: One question:)

Re-D. Q. 259. Did your duties at the Warren Electric and Specialty Company require you to have anything to do with the shipping out or shipping in of transformers?
A. No.
Re-D. Q. 260. You were not connected at all with the shipping department?
A. No.

(Mr. Fish This witness has testified he prepared an affidavit and sent it to Mr. McBerty. If the defendants have that affidavit, we would like to have it produced in court—the affidavit of Mr. Craft as stated in his testimony.)

(Mr. Church: May I ask you upon what ground you desire this affidavit?)

(Mr. Fish: Have you any affidavits?)

(Mr. Church: Yes.)

(Mr. Fish: He testified about an affidavit. We would like to see it if it relates to the subject matter of this controversy, the affidavit sent by the witness to Mr. McBerty.)

(Mr. Stackpole: We might like to cross-examine further when we have this affidavit which they have, and which we never heard of before.)

(The Court: Yes, I assume you would.)

(Mr. Church: This is a copy of the affidavit that we have.) (Referring to paper in his hand.)

(The Court: That is not the original?)

(Mr. Church: That is not the original. It is a copy. Will you accept that? I can not do better.)

(Mr. Stackpole: Do you know where the original is?)

(Mr. Church: I do not know where the original is. This is a copy handed us by Mr. McBerty.)

(Mr. Fish: What is the date of that letter?)

(Mr. Church: May 19, 1917, the affidavit he says he made was in 1913. I haven't got a copy of it; I will inquire. If there is such a copy, we will be glad to produce it.)

(Mr. Fish: We are not interested in the affidavit of 1917. We are interested in the affidavit of 1913.)

(The Court: Yes, that is the only one we are talking about.)

(Mr. Church: If there is such a one, I will inquire and produce it.)

Re-D. Q. 261. (By Mr. Church) Mr. Craft, I show you a copy of an affidavit executed in May 1917. Will you please examine it and state if you recall making an affidavit such as that, and sending it to Mr. McBerty?

(Mr. Stackpole: I object to that.)

(The Court: It is possible that is the one the witness has in mind.)

(Mr. Fish: He testified it was in 1912.)

(The Witness: Let me read it.) (Reading.)

(The Court: I noticed when he testified he gave the date of the other affidavit as before the Boston suit.)

(The Witness: I want to say I was hazy about the date of this affidavit at the time, and this is the only one I have ever made.)

(Mr. Church: That answers my question.)

(The Witness: This is the affidavit I have in mind.)

(Mr. Church: Copy of the affidavit referred to by the witness is offered in evidence as Defendant's Exhibit X.)

(Mr. Stackpole: And it is objected to.)

(The Court: You don't wish it in?)

(Mr. Church: Then I withdraw it.)

(Mr. Stackpole: The affidavit of 1913 is the one I want to see.)

(The Witness: That was my mistake.)

(Mr. Stackpole: May I ask one question?)

(The Court: Yes, relative to this affidavit.)

(Mr. Stackpole: Relative to the whole subject.)

(Mr. Church: Well, no, not unless you call him as your witness.)

(The Court: What is the controversy?)

(Mr. Stackpole: I want to ask him one or two questions, because that is a subject)—

(Mr. Church: I put this witness on for one purpose.)

(Mr. Fish: We have a right to ask your Honor to allow him to be recalled for further cross-examination.)

(The Court: Yes.)

(Mr. Church: I will not stand upon that matter. I think it will take care of itself.)

Examined by MR. STACKPOLE:

Re-X. Q. 262. When Mr. Howe called upon you in 1913, do you recall stating to him that you did not then recall any spot welded articles made in 1901 at the Warren Electric and Specialty Company?

A. I told him I was hazy about this spot welding, and I did not feel as I remembered it then that I could possibly state about the spot welding end of it. I did tell him that at that time.

Re-X. Q. 263. Since then, your recollection has been refreshed by conversations with Mr. McBerty?

A. Yes, sir.

Re-X. Q. 264. And at that time you refused to make any positive statement, because you could not recall any? Is that true?

A. Yes, sir, I was not absolutely sure. I had forgotten the whole circumstances for several years, of course.

Re-X. Q. 265. And refused to make an affidavit because you could not give Mr. Howe definite information?

A. I do not recall that I was then asked to make an affidavit.

Re-X. Q. 266. Since then, your recollection has been refreshed by conversations with Mr. McBerty?

A. Yes, sir.

Re-X. Q. 267. And specimens shown you?

A. No.

Re-X. Q. 268. Didn't you see the operation of the machine today?

A. Yes, sir.

Re-X. Q. 269. And by talking with Mr. Pattison?

A. Yes, sir.

Re-X. Q. 270. And talking with Mr. Church?

A. Yes, sir.

Re-X. Q. 271. And with anybody else?

A. No.

Re-X. Q. 272. And in 1913 you had forgotten the whole thing?

A. No.

Re-X. Q. 273. Didn't you tell that to Mr. Howe?

A. No, I didn't.

Re-X. Q. 274. What did you tell him?

A. I told him what I recalled relative to this welding proposition. I told him I was not sufficiently sure of my knowledge as to the details of this spot welding business to give him a definite statement, but I did recall the machine and described the machine to him, and what use I put it to.

Re-X. Q. 275. That is, butt welding?

A. Yes, sir.

Re-X. Q. 276. You didn't recall the details of the spot welding?

Re-X. Q. 277. As you have testified to today?

A. I did not.

Re-X. Q. 278. At that time did you tell Mr. Howe you saw these spot welded articles?

A. I can not recall whether I did or not.

Re-X. Q. 279. Didn't he ask you that?

A. I don't recall.

Re-X. Q. 280. Didn't he ask you that?

A. My whole recollection of Mr. Howe's visit is rather hazy at this time. He came in and asked me what I knew about this welding business and I talked to him, as I remember it, fifteen or twenty minutes.

Re-X. Q. 281. Did he ask you if you had seen any completed spot welded fans? I mean completed with the fan blades spot welded to the spiders.

A. I don't recollect that he did. He might have, but I don't recall it.

Re-X. Q. 282. If he had done that, do you recall any answer you made to him?

A. No.

Re-X. Q. 283. Did Mr. Howe show you any samples?

A. Not that I remember, no.

Re-X. Q. 284. You have seen no samples since 1901?

A. No.

(Mr. Church: May it please the Court: Some questions were asked the witness McBerty yesterday and were objected

to and I should like, if I may, ask the witness some further questions concerning the same line of examination, but before I do so, I should like to make a statement to the Court as to what I propose to prove. Now, it appears in the records and proceedings in this case that in the Bill of Complaint there is set up the former adjudication of the Harmatta patent in suit by the United States Circuit Court of Appeals for the First Circuit, in the case of the Thomson Electric Welding Company and the Universal Electric Welding Company, Plaintiffs, against Barney & Berry, Inc., as establishing the validity of this Harmatta patent in suit; that the plaintiff herein has offered in evidence a copy of the decree in said former suit, dated July 17, 1916, and is printed in plaintiff's record, volume I, page 17. That in the Answer in this suit it appears that the use, the prior use, of F. P. McBerty, the witness on the stand, and the prior public use of the alleged invention of the Harmatta patent by the Warren Electric and Specialty Company of Warren, Ohio are set up as defenses. That the witness McBerty has already offered testimony tending to show that before the trial of the Barney & Berry suit he had completed and put into use what is claimed to be the invention covered by the Harmatta patent, prior to the claimed date of of the Harmatta invention; and that the Warren Electric and Specialty Company had also put into public use the said invention of Harmatta for more than two years prior to the application of the patent.)

(That the witness McBerty has also offered testimony in this case tending to show that the facts concerning the prior use and prior public use by him and by the Warren Electric and Specialty Company in 1901 of the alleged invention of the Harmatta patent were communicated by him to the plantiff and to plaintiff's counsel, and the defendant and defendant's counsel in the said Barney & Berry suit prior to the trial of that suit.)

(That the witness McBerty has already testified in that case that he was present in court throughout the trial of the Barney & Berry suit and was called as a witness for the defendant and testified for defendant in that suit, but was prevented, under objection of counsel for the plaintiff in that suit, from testifying to said use and public use by him and by the Warren Electric and Specialty Company of the alleged invention of the Harmatta patent, because of the failure to plead said defenses, in the Defendant's Answer in the former suit.)

(That it further appears from the testimony of McBerty herein, and is admitted by counsel for the plaintiff herein that the Barney & Berry suit was brought for the alleged use by the defendant in that suit of a spot welding machine furnished by the Toledo Electric Welder Company, and that the Toledo

Electric Welder Company undertook to defend and did defend that suit of Barney & Berry, Inc.; Barney & Berry, Inc., being only a nominal defendant in that suit.)

(It further appears from the testimony of the witness McBerty already given herein, that Frank Warren, the secretary and general manager of the Toledo Electric Welder Company, was also present at and throughout the trial of the Barney & Berry suit. That as tending to prove collusion, between the plaintiffs and the real defendant, the Toledo Electric Welder Company, in the Barney & Berry suit, or at least, as tending to prove the suppression by the real defendant, the Toledo Electric Welder Company therein of the defenses of prior public use founded on the McBerty work of 1901, defendant herein has offered to prove and has attempted to prove by the witness McBerty that during the progress of the trial of the said Barney & Berry suit that said Frank Warren, secretary and general manager of the Toledo Electric Welder Company, declared to the said witness McBerty that prior to and during the progress of said trial the said Warren, acting for and on behalf of the Toledo Electric Welder Company, was in negotiation with the Thomson Electric Welding Company, one of the plaintiffs in that suit, and with the Universal Electric Welding Company, the other plaintiff, in that suit, for the compromise and settlement of their differences, and for the making of a nominal or partial defense to said suit. It is further offered to prove by the said witness McBerty that after the decree in said Barney & Berry suit entered July 17th, 1916, to wit: on or about the 22nd day of November, 1916, an agreement was entered into by and between the Thomson Electric Welding Company, and the Toledo Electric Welder Company acting through the said Frank Warren, its secretary and general manager, and under and in pursuance of a formal resolution of the officers and stockholders of the Toledo Electric Welder Company whereby the said Toledo Electric Welder Company acknowledged and agreed not to deny the validity of the said Harmatta patent, acknowledged said Toledo Company had defended and was the real defendant of the Barney & Berry suit, and agreed it would not engage in the electric welding business in the United States or Canada for a period of ten years thereafter.)

(It is further offered to prove by the witness McBerty that on the 22nd day of November, 1916, at the time of the agreement last mentioned, the said Frank Warren entered into a contract with the Thomson Electric Welding Company under which it was agreed that the said Warren was to enter the employment of said Thomson Electric Welding Company and receive a salary of $7,500 per annum for three years from January 1st, 1917, for his services, and was to receive as additional compensation a percentage of all the sums received by

the Thomson Company or any subsidiary company engaged in the business of selling said welding machines, of which it owned a majority of the stock, to wit: 15% of the first $50,000, 10% of the second $50,000 and 5% on all additional amounts so received that year.)

(Now, that is the situation, may it please your Honor, we desire to prove here, and it seems to me that it will have some bearing, if permitted to prove this, upon the weight that is to be given the adjudication of the Circuit Court of Appeals for the First Circuit, and upon that ground I ask leave to interrogate further Mr. McBerty and to prove the facts which we are ready to prove.)

(The Court: The exact question on which the Court ruled yesterday was whether Mr. McBerty could relate a conversation on this general subject between him and Mr. Warren. The objection was made that Mr. Warren was dead, and his testimony ought not to be received on that ground. That did not occur to me to be a valid objection. The ruling was based on the general proposition that the testimony was secondary, and was not a matter to which it could be said that the plaintiff was a party. I reviewed the matter after I left the Bench yesterday, and while I am not, as to that particular feature, altogether satisfied, that I have reached the proper conclusion, I have decided to admit the renewal of the offer to prove. This is largely, not altogether, but largely influenced by the admission made in court by the counsel for the plaintiff, that part of the purchase of the Toledo Company's interest, these evidences of alleged prior use which, of course, must occur to all of us to be of some significance at least, had been negotiated for and had passed into the possession of the plaintiff.)

(Mr. Fish: Your Honor is stating the exact admission?)

(The Court: I am not stating the exact admission. I am stating the impression)—

(Mr. Fish: There was nothing negotiated for except the purchase of the property.)

(The Court: Somebody said in settling the controversy that the Toledo Company, the plaintiff had acquired these exhibits and affidavits.)

(Mr. Fish: All the property of the Toledo Company came to the plaintiff, and these affidavits came with the rest of the property of the company.)

(The Court: I am in error in saying there was a special negotiation. I can see, too, another theory upon which it seems to me the defendant can urge why this testimony should go into this record. I am not prepared to say the theory is one I would hold on further consideration, but I can see the arguing point that has been suggested. I think I will permit you to put this testimony in over the objection of the plaintiff, and when it is all in, there will be an opportunity to determine whether it is competent or not.)

(Mr. Fish: I should like to say now, in view of this discussion on this subject, that, of course, objections will be made, and specific objections as it comes in.)

(The Court: Let us have it all go in under your objection. I think perhaps I ought to beg your pardon, Mr. Fish, in permitting you to let Mr. Church's proposition in with the objection. I assumed you would object. Mr. Church was not permitted to argue it; I took the matter away from him by proceeding to consider it. I did it solely in the interest of saving time.)

(Mr. Fish: How there can be any materiality or relevancy to such testimony as has been suggested, I certainly fail to see.)

(The Court: Certainly, some that has been suggested here would be immaterial. The fact Mr. Warren immediately became an employee of the Thomson Company, under the circumstances, I think the Court ought to hear.)

(Mr. Fish: He became such employee after the decision of the Circuit Court of Appeals.)

(The Court: The negotiations between the Toledo Company and the Thomson Company of the character suggested, I think, would be material.)

(Mr. Fish: I don't think Mr. McBerty can prove those negotiations by saying what Mr. Warren told him under any circumstances.)

(The Court: I don't think so either, as far as that is concerned.)

(Mr. Fish: That is as far as the suggestion goes.)

(The Court: I think I will let Mr. Church take the testimony.)

(Mr. Fish: We shall object generally and ask that exceptions be reserved.)

(The Court: Yes.)

F. P. McBERTY, recalled on behalf of the defendant, testified as follows:

Examined by MR. CHURCH:

Q. 368. Mr. McBerty, during the progress of the trial in Massachusetts in the Barney & Berry case, you were in frequent conference, were you not, with Mr. Frank Warren of the Toledo Electric Welder Company?

A. I was.

(Mr. Stackpole: We object.)

(The Court: Yes. The question and answer go in under objection and exception.)

(Mr. Fish: I should like to be allowed to call special attention to certain objections.)

(The Court: Oh, certainly.)

(Mr. Fish: Of course, the understanding is that the objection applies generally to all this line of testimony.)

(The Court: Yes.)

(Question read.)

A. I was.

Q. 369. Will you please state to the Court what developed, what declarations Mr. Frank Warren made on that occasion in regard to his efforts to settle the controversy while it was still in court and in regard to his making a partial or nominal defense in that case?

(Mr. Fish: I would like to have your Honor revise your ruling as to that question.)

(The Court: You may answer the question . You have the exception.)

A. I should like to read an extract from a letter written very shortly after that, because it will give a better idea than I can quote from memory.

Q. 370. You may refresh your recollection from that letter. To whom was that letter written?

A. This letter was written to the attorney of the National Electric Welder Company, J. Nota McGill, dated April 19, 1914.

Q. 371. Will you please read the letter? By whom was it written?

A. It was written by myself.

(Mr. Fish: He is reading a letter instead of testifying as to what Mr. Warren said. The question asked him was to testify what Mr. Warren said.)

(The Court: Do you object to his using the letter to refresh his memory?

(Mr. Fish: I suppose he has a right to refresh his recollection but it would be well to answer the question.)

(The Court: Yes, he can refresh his recollection, but not read the letter into the record.)

A. This case was decided against Barney & Berry, suit being instituted by the Thomson Company for infringement of the Harmatta patent, and defended by the Toledo Company. I was sent for by telegram the last day of March, 1914, requesting that I appear at Boston the next morning, prepared to give such information as I could. And after I had been there a couple of days, Mr. Warren became confidential and told me he had been down to Franklin to see the Universal people—

(The Court: They were co-complainants?)

A. As I understand, they were. I think he had been down there about three weeks, and his efforts were directed to getting together with the Universal, the Thomson Company and his own company, under some working arrangement whereby the Harmatta patent could be sustained and they all get a share of the royalties acquired in that manner. He also told me the case had been postponed one week to permit them to get this settlement arranged somehow, which gave me the impression that the Thomson Company were interested in having such a settlement made.

(Mr. Fish: That is objected to. This is a very gross injustice, to have this sort of gossip in the case.)

(The Court: That goes out.)

Q. 372. State what he told you, not your impressions.

A. He told me that the day before, which would be the last day

of March, he had a contract already written out and signed by Mr. Lachman of the Universal Company, which was based on the not making void of the Harmatta patent, and then the patent would be sustained and the Toledo Company would place their machines on a rental basis and the portion of the rental so acquired would be divided between the Thomson Company, a portion; to the Toledo Company a portion; and to the Universal Company a portion. They outlined all the terms to me. This was entirely satisfactory to the Universal Company and was signed by Mr. Lachman. When he went to the Thomson Company at Lynn, Mass., things were satisfactory to them, but there was one significant fact concerning this arrangement at this time, the deal being entirely between the Toledo Company and the Universal Company. When he returned to Boston to be present at the case to be tried, he found the Universal people were not going to be in the position he anticipated, and somebody told him Mr. Lachman had no authority to bind his company to such sort of contract. The result was he was compelled to go to trial, or his attorneys were compelled to go ahead with the trial.

(Mr. Fish: Are you now stating what Mr. Warren told you?)

(The Witness: I am now stating what Mr. Warren told me, and they were not prepared, on account of their hurried call to me to come down and furnish such testimony as I could. Mr. Warren told me if they did not get together with a settlement, he was going to clean up all his outstanding indebtedness, dispose of his interest in the business, and go out of the business, that he would not fight it any more. If there was any further fighting to do, the users of the electric welding machines would have to do it.)

Q. 373. Have you finished?

A. That is all, I think, that has any bearing on that particular end of it.

Q. 374. Did you at any subsequent time learn from Mr. Warren what arrangement had been effected with the Thomson Company and the Universal Company?

(Mr. Fish: The same objection and exception.)

(The Court: Overruled. Proceed.)

(Question read.)

A. That, I understand, refers to the Thomson, the Universal and the Toledo?

Q. 375. Yes.

A. Mr. Warren told me that he had a contract with the Thomson Company whereby he was to be retained under a specified sal-

ary, a percentage of the money collected as royalty under the Harmatta patent, on Toledo machines then in operation. This was given to me at Toledo, Ohio, when there was a meeting called of the spot welder manufacturers with a view of getting them all to operate under the Harmatta patent; Mr. Warren being appointed to line them up for that purpose.

(*McBerty's testimony continued, page* 331.)

(Mr. Church: May it please your Honor, I have here in print a copy of the contracts that were made between the Thomson Electric Welding Company, the Universal Electric Welding Company and the Toledo Electric Welder Company in regard to this subject; also, the contract that was made between the Thomson Electric Welding Company and Mr. Warren for his employment. There are present in court the president of the Thomson Electric Welding Company and the vice-president and the secretary, and if Mr. Fish requires me to prove this document by calling those gentlemen, I will do so, or he may admit it. I will submit it to the Court; it is in print, printed by the Thomson Electric Welding Company.)

(Mr. Fish: From what point of view are the contracts of these various welding companies admissible at this stage of the case, or for any purpose conceivable? I suppose your Honor will let it in in accordance with the theory you have let this general discussion into the case, but the other contracts are entirely irrelevant from any point of view.)

(The Court: I have read the record in the Massachusetts case, so far as it appears in this volume, and confess I can not see how anybody could arise from the reading of that record without a feeling—well, say of bewilderment, as to how this thing came about. I have read Judge Putnam's opinion over two or three times. I really don't get much out of it. I find in reading Judge Dodge sends it back. I do not mean to be understood as saying that I find anything in this record has a sinister cast to it, of course, not, but it does seem there is some significance in the fact, if it is a fact as stated by Mr. Church, that immediately after the perfunctory decree of Judge Dodge was entered, or shortly after it was entered)—

(Mr. Church: Five months.)

(The Court: The contest was settled in this way. If this were a real contest, a real victory, it seems to me there would be no special reason why the complainant should buy out the defendant.)

(Mr. Fish: May it please the Court, it was a very profitable transaction for the plaintiff; however, I suppose that is

not open for argument now. They made most favorable contracts, far better than any attempt at monopolizing)—

(The Court: Oh, the Toledo people had made contracts for its product obtained in that way? Is that what you mean?)

(Mr. Fish: No. We came in contact with all these companies and their business became our business, and they gave us a large share which became very large indeed. They took us practically into partnership; that is what they did, working on the line of least resistance much more than we could make by enforcing the monopoly.)

(The Court: Was there a reference after Judge Dodge's interlocutory decree taken? Was there a reference to a master?)

(Mr. Church: Oh, no; that was wiped out.)

(Mr. Fish: The real defendant was not in court; the whole thing was settled.)

(Mr. Church: They said they were going out to sue this Toledo company in Ohio.)

(Mr. Fish: Of course. It was a complete settlement with the manufacturers.)

(The Court: I think this is competent. I will hear it. Do you want Mr. McBerty on the stand any more?)

(Mr. Fish: No.)

(Mr. Church: If the contracts are not admitted, I will call Mr. Farley on the stand.)

(I will read a list of them:)

"Option;
Agreement to Sell;
Bill of Sale;
Toledo Guaranty to Thomson Company;
Authority to Mr. Frank Warren to Sell from all Stockholders of Toledo Company;
Assent to Sale on behalf of all Stockholders of Toledo Company;
Agreement by Thomson Company to Purchase Certain Machines from Toledo Company under Certain Conditions;
Personal Undertaking by Stockholders of Toledo Company not to Compete;

Employment of Mr. Frank Warren by Thomson Company;
Extract from Minutes of Special Meeting of Stockholders of Thomson Electric Welding Company held November 17, 1916;
Extract from Minutes of Special Meeting of Stockholders of Thomson Electric Welding Company held December 20, 1916;
Minutes of Stockholders' Meeting, Toledo Company;
Agreement relative to Cash on Hand."

(I think they might be admitted without taking the time to prove them by one of the officers.)

(Mr. Fish: I think you had better put Mr. Farley on the stand.)

(The Court: Did he sign these contracts?)

(Mr. Church: Certainly; here they are.)

(Mr. Fish: I think if you will put Mr. Farley on the stand, we will cross-examine and ask him some questions with reference to them.)

JOHN W. FARLEY.

JOHN W. FARLEY, after being duly sworn on behalf of the defendant, testified as follows:

Direct examination by MR. CHURCH:

Question 1. Please state your name, age, residence and occupation.

Answer. John W. Farley; 84 State Street; lawyer primarily.

Q. 2. Are you an officer of the plaintiff in this case?

A. I am.

Q. 3. What is your office?

A. President.

Q. 4. You were an officer, were you not of the Thomson Electric Welding Company?

A. I think so; I am not sure just how the changes came around. Yes, I was.

Q. 5. And you were the president of that company, were you not, in November, 1916?

A. Yes, sir.

Q. 6. I hold in my hand a pamphlet containing a list of transactions, containing a series of transactions, the index of which I have just read in your hearing. You heard me read it, did you not?

A. I heard a noise; I did not hear your articulation.

Q. 7. Will you please examine the pamphlet I now show you and state whether or not the originals of the documents that are therein contained are not in the possession of your company?

A. I assume so. I am thoroughly familiar with this.

Q. 8. This was a pamphlet put out by your company for the use of its officers and stockholders was it not?

A. I can not say as to that. It was printed with my knowledge. I don't know whether it was for the files or what the purpose was.

Q. 9. So far as you know and believe, that is a correct copy of those various documents, is it not?

A. You will appreciate, I am sure, that I will have to read them. There is only one with which I am thoroughly familiar.

Q. 10. And you doubt not, barring perhaps the transcriber's mistakes, it represents a correct copy of all those documents?

A. As to the ones I am familiar with; I can not tell you any more than my impression by looking at those. I have no reason to doubt it.

(The Court: It was intended to be so when printed, was it not?)

A. Oh, absolutely so. I only say I can not state of my own knowledge. I have not the slightest doubt about it.

Q. 11. Are there many of those documents in circulation?

A. I haven't any idea. We had quite a number of them printed.

(Mr. Church: I offer this pamphlet in evidence as Defendant's Exhibit 62. You may cross-examine, Mr. Fish.)

(The Witness: Some of these I know nothing about; some I think, with the Toledo Company, which I never saw, and know nothing about.)

Q. 12. (By Mr. Church.) But you think that represents a true copy of transactions that are therein related?

A. Yes, sir.

Cross-examination by MR. FISH:

X-Q. 13. When did you become connected with the Thomson Electric Welding Company, as nearly as you can state?

A. Early in 1916.

X-Q. 14. What knowledge had you of the company at the time of the decision of the First Circuit Court of Appeals—when was that, Mr. Stackpole?

(The Court: October 5, 1915.)

(The Witness: I had never heard of the company until about three or four weeks prior to that time.)

X-Q. 15. And at that time how did it happen that you became connected with the company?

A. That will require a rather lengthy answer, sir.

X-Q. 16. I do not see why it should be very lengthy, but I suppose we have to have it.

A. My senior partner, Mr. Herrick, had acquired some stock in the company; he was going south, and gave me a proxy; that is the first I had heard of the company. I inquired about it and ascertained its general situation and ultimately went—I think Mr. Lyne was sent to the first stockholders' meeting, which was the annual meeting, and it was adjourned. Shortly thereafter, I went down myself.

X-Q. 17. When you say "down" you mean?

A. To Lynn, Mass., where the annual meeting was held, and it appears that I with several others had a majority of the stock so that a Board of Directors somewhat different from the prior board was thereupon elected, I among others. The Board of Directors met shortly thereafter; they may have met immediately thereafter, but I am not sure of that. And after some formal and informal discussion, it was decided I should be elected president, which I was.

X-Q. 18. What was what date?

A. Well, I am not certain; my impression is it was about the middle of March, 1916.

X-Q. 19. The middle of March?

A. Yes, sir.

X-Q. 20. And at that time you and the Board of Directors directed the policy of the company?

A. From that time.

X-Q. 21. Before that, you had nothing to do with it?

A. Absolutely nothing, sir.

X-Q. 22. Will you state the negotiations with the Toledo Company, or Mr. Warren, that led up to the contract that Mr. Church has introduced in evidence?

A. The first time I saw Mr. Warren personally was some time in the fall of 1916—no, there had been one at least prior conversation, some time before that.

X-Q. 23. By whom? Do you know?

A. Yes, sir. Mr. Cutter.

X-Q. 24. Mr. Cutter was general manager of the company?

A. Yes, sir, he was general manager, I should say, from the first of April, 1916.

X-Q. 25. Had he any connection with the company prior to this reorganization?

A. No.

X-Q. 26. And you know officially, of course, Mr. Cutter's interview with Mr. Warren?

A. Yes, sir.

X-Q. 27. Have you any idea when that was?

A. Yes, sir.

X-Q. 28. When was that?

A. It was in August, 1916.

X-Q. 29. Proceed.

A. Shall I tell my own interview only, or the information I received officially and otherwise from Mr. Cutter?

X-Q. 30. You say that was August 15th, 1916?

A. No, in August, I don't know what time, but it was 1916.

X-Q. 31. You may tell in your own way what led up to the contract which Mr. Church has put in. If Mr. Church does not like the way you tell it, he can say so.

A. Well, immediately upon becoming connected with the company, I made every effort possible to simplify what I found to be the situation. The affairs of the company had dragged on without much activity for some years; and there were two problems which confronted us. The first was that we—I am speaking now of the old company, the Thomson Electric Welding Company, had no real opportunity to do business with the spot welders, because the sole selling rights were in the Universal Company, and I felt, and the directors felt, that unless that company was got out of the way in some way or stimulated to activity, our business was at a standstill. There was another problem which would arise immeditaely, if we solved the first one: That was to get adequate manufacturing facilities, because, owing to the way the business had been conducted, and the inactivity or lack of success or whatever, of the Universal Company, we were not well equipped to make spot welders in any adequate number. I immediately began negotiations with the Universal Company; I can not say the exact date, but I should say it was about as quickly as I could get to New York after I became president; and those negotiations continued through various phases until the middle of November, 1916. At the same time we were trying to get all the different lines we could on manufacturing facilities, but I felt that was not the more pressing problem, because we could not use those until we had got rid of the situation in which the Universal Company had us. I went to Plattsburg. I think it was about the 6th of August, 1916.

X-Q. 32. You mean the Plattsburg camp?

A. Yes, sir.

(Mr. Fish: Farley has been abroad, and therefore, had his training at Plattsburg.)

A. While I was there, my negotiations by letter continued with the Universal people, and Mr. Cutter wrote me that Mr. Warren had come on to see him, and of the substance of his interview with Mr. Warren.

X-Q. 33. This was in August?

A. This was in August, what time I don't know; I should say about the middle. I corresponded with Mr. Cutter about this, and

told him that the first essential for us was to know, if we were to have any dealings with Mr. Warren at all, was the physical valuation of his assets, and later, Mr. Cutter, after going to Toledo, wrote me a report of the result of his inspection there. I can not say when it was, that I saw Mr. Warren myself after that; it was probably in October, although my recollection is not definite. At any rate, I did see him once in New York fairly early in the fall, and we had a conversation about purchasing his assets. I rather staved him off at the time, because, while I was hopeful about making a trade with the Universal, the negotiations were somewhat up and down. We almost had it made one day, and then were on the verge of a violent quarrel the next, so I didn't want to be in any way committed to Warren before I was sure we could get the Universal contract. So I continued to try to carry on the two flirtations simultaneously, and ultimately, about the first of November, they were brought both to a head at about the same time. Now, I think it was the same night, the same date, not eaxctly, but within a couple of days, anyway, I got an option, after I had made a pretty definite arrangement with the Universal Company—from Mr. Warren, closed with the Universal, and then took up the option from Warren a month or so later, a 30-day option, as I remember it. I am not perfectly sure which came first, but they were practically simultaneous, and the two, from my point of view, seemed interdependent; I was not going to do either unless I could do both. Then those trades were made in November, I should say, about the first of November. I suppose I can refresh my recollection exactly on that here, I think (referring to memorandum). Well, the option with the Toledo Company was the second of November, and I think the agreement with the Universal was that day, or the preliminary agreement with the Universal was that day, or the prior day.

X-Q. 34. You say an option with the Toledo Company; do you mean option?

A. Yes, it is the first document in this printed exhibit. It is followed by a contract—or option. Well, there was a contract taking over all the assets; this is simply a five-line option, and then later we executed the formal agreement for taking over all the assets.

X-Q. 35. That is, the exercise of the option?

A. Yes, sir.

X-Q. 36. When was that, do you know?

A. I think it was November 22nd; I am not sure of the date. The bill of sale was executed on the 22nd.

X-Q. 37. You have spoken of the Universal, and your carrying the two trades along together; can you state what was the general character of the trade with the Universal that was consummated about the same time as the one with Toledo?

A. Yes. I don't know whether that is in here or not.

X-Q. 38. State from memory; I do not care for the particulars.

A. They had some outstanding contracts by which they were getting license fees or rentals, whatever, for some of these machines, and we bought all the contracts of the Universal, all their rights, title and interest of any kind in the spot welding machines, and all rights to any spot welding patterns, other than certain so-called product patents, for preferred stock in a new company which was to be formed.

X-Q. 39. And you got back all the contracts under the Harmatta patent?

A. They gave up all their rights whatsoever under the Harmatta patent and all other spot welding patents, the so-called spot welding patents. The trade was that this preferred stock was not to be in the original Thomson Electric Welding Company, but in a new company which was to be formed, which was to acquire the assets of the Toledo Company, and also all the assets of the old Thomson Company, relating to spot welding, including the Harmatta patent. This is, we tried to cut the thing in two, to put all the spot welding trade in one company, and all the butt welding trade in the other, and the trade was preferred stock in the new company to the Universal Company; the Thomson Company keeping, of having issued to it all the common stock in that new company. That new company is the Thomson Spot Welder Company, which is the present plaintiff. After the negotiations or closing of the trade on November 2nd or thereabouts, we went back to Boston to raise the money to buy the Toledo Company, and my recollection is we got it about the 22nd of November. That is largely dependent upon refreshing my memory on these dates. We carried out the trades practically simultaneously, forming the new company, issuing the stock to the Universal Company, and taking over the assets from the Toledo Company.

X-Q. 40. And you say your purpose in taking the Toledo Company was what?

A. It was to get an adequate method or adequate facilities for manufacturing welders with what the patent would do, in the way of increased business when we had a chance to run our own show instead of being dependent upon the inactivities of the Universal Company.

X-Q. 41. In taking up these negotiations with Mr. Warren of the Toledo Company, was the thing started *de novo*, or was it from your point of view a continuation of the negotiations?

A. Absolutely *de novo*. That is, not only that, but I know when I first talked with Mr. Warren, we were very chary about committing ourselves in anyway because of the situation with the Universal, and he seemed fairly shy about—he gave no definite assurance as to what he would or would not do.

X-Q. 42. In any sense, did he take up any of these negotiations and carry them through?

A. I never heard, although, I believe, there were——

X-Q. 43. The new officers of the Thomson Electric Welding Company had charge of those negotiations for that company?

A. Absolutely. I think they were all new, except one director and Mr. Hodges, the previous treasurer, whom we retired—I don't know—about as soon as we could.

X-Q. 44. Did the Universal Company play the game with you in trying to take any part in your negotiations with the Toledo Company?

A. I can not answer that question direct by yes or no. If I may state it in my own way?

X-Q. 45. State the facts.

A. I had a letter from Mr. Hodges of the Universal Company in August at Plattsburg, in which he was very much annoyed because Mr. Cutter and Mr. Warren had apparently been talking together about the possibility of some trade, and I could not quite make out why, but apparently because he thought we should have taken up anything new through him. I think his theory at first was to get Warren to trade with him and leave us out, but as the thing developed, he was quite ready to come along when he found he could not get Warren himself.

X-Q. 46. But he had nothing to do with that trade, with the trade of the Thomson Company?

A. No, absolutely not. He was quite cognizant of it, because I told him that was the way I proposed to pay him, in stock, which involved that trade.

X-Q. 47. His Honor has called attention to the fact that the record does not show any accounting with the Toledo Company, or even with the Barney & Berry Company. What was the fact as to the claim of the Thomson Electric Welding Company as it lay in your mind, as it was regarded by the company, after you took hold of the management, and how was that handled in this situation?

A. I have asked Mr. Stackpole, I suppose, 15 times why he did not hurry up and finish the accounting.

X-Q. 48. The Toledo Company was not a party to the suit in Massachusetts?

A. No, not technically, as I understand it.

X-Q. 49. I don't know the facts. Do you regard now that they have a claim against the Toledo Welding Company, a claim for damages?

A. That was one of the things wiped out, as I understand it, by the transaction. We had a very material one prior to that date, and it was that fact I urged as one of the reasons the Warren company had better sell.

X-Q. 50. That is, that was one of your trading arguments?

A. Yes, sir.

X-Q. 51. And the necessity for settlement was eliminated by this purchase?

A. Yes, sir, as I understood the original question; it also related to a contract with Mr. Warren.

X-Q. 52. Yes, that is the situation also.

A. I think that is in here (referring to pamphlet). I can not state exactly.

X-Q. 53. Is there anything else that occurs to you, Mr. Farley, that you would like to explain in reference to this matter?

A. I can not state exactly when we made that trade with Mr. Warren about his services, but I can state that it was subsequent to the time that the option of sale was given by him, because I remember—but perhaps the reason is not material. We talked it over a good deal just at and about the time we put through the final trade, and I think the contract is as of the same date. I can state at length the reasons for it, but I don't know as I am asked that.

X-Q. 54. Well, I will ask you to state the reasons why you made the contract, and all the reasons, and in particular whether it was in continuation of any trade or understanding or relation of any sort or kind?

A. Absolutely not, sir. It was a matter of grave doubt in our minds whether we should make a contract with Warren or not, and we expressly declined to commit ourselves about it or to have any negotiations about it at the time of getting the option. It was a question whether the advantage of getting it, on account of his knowledge of the business, some of his good will with his customers offset the possible disadvantage of having him with us, a man who had been on the opposite end as a rival, and we debated it pro and con and finally decided to take him primarily to see if he could not be worked out in what we called the Royalty Department; that is, with reference to making settlements or royalties on machines that users had had for some time, rather than to develop new business, and it was because we believed that he could be of great assistance to us in getting settlements or working out contracts such as we offered to every one of that nature, that we finally decided to employ him, and to employ him on a contingent basis which I personally felt was the way we would most likely get—I don't mean fully contingent, but partly contingent—which I personally felt was likely to produce most revenue for the company.

X-Q. 55. Did you know anything of the affairs of the Thomson Company or the Universal Company, anything of the conduct of the litigation by Mr. Warren or any of the elements of the situation, prior to the time, or shortly before you were elected president, when those facts as you have stated were called to your attention?

A. Never except a friend of mine, I should say about three or four weeks before Mr. Herrick gave me this proxy, I told him the Thomson Electric Welding Company had just won a very interesting suit, purely casually, and I never thought of it again, until by coincidence I happened to get interested in the company.

X-Q. 56. Who were the officers of the Thomson Company before you took hold of it, do you remember?

A. Hodges was treasurer, I think Mr. Spinney was president.

X-Q. 57. Do you remember Mr. Spinney's age, or did you know it?

A. I have been told it was somewhere in the 80's.

(The Court: What was his first name?)

(The Witness: Benjamin F. Spinney.)

X-Q. 58. (By Mr. Stackpole.) He is a shoe manufacturer in Lynn?

A. Oh, yes; he had retired at that time.

X-Q. 59. And you know what the qualifications of Mr. Hodges were in the position? I mean, by training.

A. He had a long experience.

X-Q. 60. What was his qualification by training before he had the position?

A. Prior to his going in, I haven't any idea.

(The Court: Do you make a distinction between training and experience?)

(Mr. Fish: I would like to have your Honor get the situation. I do not want to put that into the record, but I would like to have the witness explain it.)

X-Q. 61. Who were retained over?

A. Mr. Sprague was one of the directors and is still a director. He was the only one that stayed over, and Professor Thomson, who was and still is vice-president. That is all I recollect.

Redirect examination by MR. CHURCH:

Re-D. Q. 62. There is in the record in this case, introduced as part of the title papers apparently, some contracts between the Thomson Electric Welding Company and the Universal Company, dating back as early as June, 1909, and another one of July 20th, 1909; you know of those contracts, I suppose; are they not the ones by which the Universal Company acquired the rights to which you have referred?

A. I can not tell from your question. I have been all over those contracts, and there were prior contracts.

Re-D. Q. 63. And it was under those contracts, you understand, that the Universal Company got its right to lease spot welding machines? Is that correct?

A. They got them under existing contracts, of course, Mr. Church.

Re-D. Q. 64. I think quite a number, but the Universal Company, had the exclusive right to put out spot welding machines?

A. That is as I recollect those contracts. That is the effect of them. I don't know how long.

Re-D. Q. 65. And they put them out under licenses and the fruits of the licenses were realized by the Thomson Company, is that correct?

A. I think so. I think we were to get a fixed amount from each machine.

Re-D. Q. 66. And the rights of the Universal Company were exclusive and bothered the Thomson Company somewhat; is that the situation that was attempted to be cleared up?

A. I don't think "bothered" is the adequate word.

Re-D. Q. 67. Not strong enough?

A. It wasn't from my point of view. It had us tied hand and foot, gagged, and we could not move or wiggle.

Re-D. Q. 68. Those contracts and rights of the Universal Company under which it had exclusive rights to put out spot welders and receive license fees from people who acquired the machines were long before the issuing of the Harmatta patent in 1912?

A. I can not state as to that. My impression is—of course, the contracts will speak for themselves—my impression is they came—there is a long string of them, I think there were about seven contracts with modifications, and I can not remember the date the first comes in, and there is a reference to the Harmatta patent, but at what stage it was, I don't know.

Re-D. Q. 69. The Harmatta patent was not referred to until it was issued in 1912?

A. You are as able to judge of that as I am.

Re-D. Q. 70. That is the fact?

A. I don't know. It is a fair assumption.

Re-D. Q. 71. Is it not a fact that the Universal Company, long before the issuance of the Harmatta patent here in suit, was putting out spot welding machines, leasing them, and was deriving a profit from them under the authority of the Rietzel patent of July, 1909?

A. I don't know anything about it. I should be surprised if that was so, but it might be, yes or no, as far as my knowledge is concerned.

Re-D. Q. 72. You are the president of the Thomson Spot Welder Company, are you not?

A. I am.

Re-D. Q. 73. And custodian of all those contracts?

A. No, I don't suppose I am.

(Mr. Fish: What has this to do with the subject we are discussing? Mr. Farley says he knows nothing about this proposition.)

Re-D. Q. 74. Let us come back to what you did testify to. You say you were put into this company as a sort of stop gap for Mr. Herrick?

A. No, I did not say any such thing.
Re-D. Q. 75. Is that a fact?
A. No.
Re-D. Q. 76. Who is Mr. Herrick?
A. He is my senior partner.
Re-D. Q. 77. Is he a lawyer?
A. Yes, sir.
Re-D. Q. 78. What is his full name?
A. Robert F.
Re-D. Q. 79. He is a lawyer?
A. Yes, sir.
Re-D. Q. 80. You are a lawyer, are you not?
A. Yes, sir.
Re-D. Q. 81. And Mr. Daniel J. Lyne, clerk of the Thomson Electric Welding Company, present in court, is a lawyer, is he not?
A. Yes, sir.
Re-D. Q. 82. Are there any other lawyers who have offices in this Thomson Electric Welding Company?
A. I don't think so.
Re-D. Q. 83. It would appear, then, that this spot welding company is represented by lawyers with offices?
A. If that is an observation, it is unwarranted; if it is intended as a statement of fact, it is inaccurate.
Re-D. Q. 84. Well, the president is a lawyer, and the clerk of the corporation is a lawyer, and the gentleman you represented and in whose behalf you were made president——
A. Mr. Church, I have already corrected you once in that statement.
Re-D. Q. 85. How is that?
A. That I did not primarily represent Mr. Herrick as president.
Re-D. Q. 86. You did not?
A. I did not.
Re-D. Q. 87. You were made president because he was going out of the country, is that correct?
A. No, I don't think so. That is one element, if you want to argue——
Re-D. Q. 88. No, I don't wish to argue at all. I just wanted to get the facts. Now, the fact is your interest in this company commenced in November, 1916?
A. That is not.
Re-D. Q. 89. When did you commence?
A. In March, 1916.
Re-D. Q. 90. Now during the course of the Barney & Berry suit, were you not an officer of the Thomson Company?
A. I have already stated I had never heard of the company at that time.
Re-D. Q. 91. So that you don't know anything about any transactions that may have occurred between——

A. You are not seriously asking me that I don't know anything about something I never heard of, are you, Mr. Church?

Re-D. Q. 92. Will you answer my question?

A. No, I don't know.

Re-D. Q. 93. I suppose lawyers like to argue a proposition.

A. I am afraid so. I will try to refrain.

Re-D. Q. 94. I think that is all.

(Mr. Fish: That is all, unless something occurs to you that will throw light upon the matter.)

(Mr. Church: You may cross-examine Mr. McBerty.)

F. P. McBERTY.

F. P. McBERTY, recalled for cross-examination, testified as follows:

Examined by MR. STACKPOLE:

X-Q. 376. Will you let me see the letter you refreshed your recollection from just recently about——

(Witness hands paper to counsel.)

(Mr. Fish: You may go on with the cross-examination, Mr. Stackpole, and let me look the letter over.)

X-Q. 377. (By Mr. Stackpole.) In the spot welding experiments you made this morning at the factory of the Ford plant, with the machine here, is that machine in exactly the same condition in all respects as it was at the factory of the Warren Electric & Specialty Company in 1901, when you made your alleged spot welds that year?

A. It is not.

X-Q. 378. How does it differ?

A. We have two new cam levers to replace the original cam levers, apparently lost some time after the use of the machine was discontinued.

X-Q. 379. Is that all the difference?

A. There is new fibre insulation between the two halves of the bed plate.

X-Q. 380. Anything else?

A. I would not want to say that the dies are the original dies; I know the copper electrodes I used today were the copper electrodes I used at that time.

X-Q. 381. What do you mean by dies?

A. The two movable parts that are arranged to clasp the electrodes or clamp the arms.

X-Q. 382. You would not swear that the clamps or dies were the same then?

A. No, I would not be in position to swear they were the same.

X-Q. 383. Are they exact reproductions?

A. They are as near exact reproductions as an ordinary mechanical equipment is made of that type.

(The Court: You mean they may or may not be the originals, or that you don't know?)

(The Witness: They may or may not be the originals; that is so.)

X-Q. 384. (By Mr. Stackpole.) Are the electrodes the original ones?

A. In referring to the electrodes, what particular part do you refer to?

X-Q. 385. I thought you understood that; the copper rod held by the clamps between which the work is pinched and spot welded.

X-Q. 386. You refer to my spot welding points?

A. Yes, sir.

X-Q. 387. I said they were not.

A. They were not.

X-Q. 388. They were not? I thought you said they were.

A. They were not.

X-Q. 389. Are they exact reproductions?

A. As near as I can produce them.

X-Q. 390. Did the originals have the shoulders on them that these electrodes have?

A. They did.

X-Q. 391. And was that kind of electrode the only kind you used in 1901 for spot welding?

A. That was the only kind I used successfully.

X-Q. 392. What other kind did you use?

A. We used just plain rounded copper wire without the shoulder on.

X-Q. 393. But they were the straight electrodes like this, with or without shoulders?

A. No; the first sets were formed to fit the dies, because the first set of dies that were in the machine when the spot welding was done were curved.

X-Q. 394. Were curved to fit the curvature of the dies used for the plane dies?

A. Yes, sir.

X-Q. 395. And then you made some new dies?

A. Yes, sir.

X-Q. 396. And those were straight dies?

A. Yes, sir.

X-Q. 397. And you used straight electrodes?

A. Yes, sir.

X-Q. 398. And nothing else for electrodes?

A. That is all I have any knowledge of.

X-Q. 399. So we know now you used this and nothing else. You are positive of that, are you?

A. No I am not saying positively that I used nothing else. We experimented with other types.

X-Q. 400. In making electrodes did you use anything else?

A. I used offset electrodes at one time.

X-Q. 401. What do you mean by offset electrodes?

A. The fact that it is bent so the point of contact is not in direct line with the die, but slightly above it.

X-Q. 402. An S-shaped?

A. No, a Z-shape, I would say.

X-Q. 403. And which electrode did you use——

A. The fan blades were electrically welded with the straight electrodes; we could not supply sufficient power with these Z-shape electrodes.

X-Q. 404. So on the fans you used the straight, not those that were bent up?

A. Yes, sir.

X-Q. 405. Why did you use the curved electrodes?

A. There was an insulation in the center of the machine which prevented us getting our work down at the proper height.

X-Q. 406. How many fan blades did you weld with those?

A. I would not want to say.

X-Q. 407. Did you ever weld a complete fan blade with them?

A. I would not want to say whether I made a complete one or not.

X-Q. 408. When did you first use the offset electrodes, what part of the year?

A. That was the first effort I made to weld fan blades to the center.

X-Q. 409. And you used that because there was an insulation running the whole length between the bottom plates?

A. Running the whole length, and I could not get my blade in low enough to reach it.

X-Q. 410. Why did you cut out the insulation?

A. So I could put the blade in between the openings of the two plates and use my straight electrode, which gave me more pressure and better contact.

X-Q. 411. Was there any other reason for removing the fibre?

A. No, none that I know of.

X-Q. 412. Did you ever tell anybody you removed it or had removed it for any other reason?

A. I would not want to say that.

X-Q. 413. You remember telling Mr. Howe that?

A. No, sir, I would not say that.

X-Q. 414. Mr. Howe spent two weeks with you?

A. I would not want to say it was two weeks.

X-Q. 415. You remember he took your affidavit?

A. Yes, sir.

X-Q. 416. And you took him around to other people?

A. Yes, sir.

X-Q. 417. And you don't remember whether you told him you cut away this fibre or not?

A. I don't remember whether I told him I cut away the fibre or told him any reason why I cut away the fibre.

X-Q. 418. Now, what time of the year did you cut away that fibre?

A. That fibre was cut away when we first welded our blades.

X-Q. 419. What time of the year was that?

A. That was in the early spring.

X-Q. 420. What do you mean by early spring?

A. In either January or February.

X-Q. 421. Do you call January or February spring?

A. Yes, I would call it the spring period.

X-Q. 422. That is an accurate statement, is it?

A. Yes, sir.

X-Q. 423. And you made these fan blades early in January?

A. Either early in January or the first of February; that is, the first part of February.

X-Q. 424. Did you make any in January?

A. I would not say.

X-Q. 425. How do you identify February as the month?

A. I identify February as the month on account of my first piece of work being produced, which was produced in February.

X-Q. 426. What is that, Exhibit M?

A. I don't remember the number of the exhibit.

(Mr. Stackpole: Has your Honor that?)

(The Court: Yes.)

X-Q. 427. That has stamped on it February 15, 1901, I believe.

A. Yes, sir.

X-Q. 428. Had you made any complete four-bladed fan blades at that time?

A. I think not; otherwise, it would not have been stamped as my first production along those lines.

X-Q. 429. Had you made any before that?

A. No.

X-Q. 430. Where did you get the blade that was not punched?

A. We may have had it in stock there.

X-Q. 431. Were your ordinary blades punched with rivet holes?

A. Oh, yes; the ordinary blades were punched.

X-Q. 432. For that type of fan?

A. No, sir.

X-Q. 433. For any type of fan?

A. No.

X-Q. 434. For that particular type of fan, you punched the blade for rivet holes?

A. Yes, sir.

X-Q. 435. It was after that time?

A. What do you mean by "after that time?"

X-Q. 436. When they decided to continue the manufacture of that type of fan.

(The Court: Here is the exhibit you asked for, Mr. Stackpole.)

(Mr. Fish: Here is the letter which I will give back into your custody, Mr. McBerty.)

X-Q. 437. When the blades were first gotten out for this type of fan, were they punched for rivet holes, or were they not?

A. I would not want to say.

X-Q. 438. Why not?

A. Well, it is a matter of recollection, and it is a long time ago.

X-Q. 439. At any rate, did you weld any blades that were punched, and spiders?

A. Yes, sir.

X-Q. 440. And welded blades that were not punched with spiders?

A. Yes, sir.

X-Q. 441. And I believe you said that you welded four blades to some of the spiders?

A. Yes, sir, I have welded four blades to every spider that was a complete fan.

X-Q. 442. How many of those were there?

A. I must be rather indefinite, 15 or 16.

X-Q. 443. Were they all made in one day?

A. I won't say that.

X-Q. 444. In how many days were they made?

A. I cannot say that.

X-Q. 445. Were they all made in a week?

A. I am under the impression they were in less time than that.

X-Q. 446. In the ordinary commercial production of fans, how many complete assemblage of blades and spiders would be made in a day?

A. It depends entirely upon our shop orders; if those parts would equal the work being produced.

X-Q. 447. What was the average at that time?

A. I don't recollect. I did not work at it myself.

X-Q. 448. It would be more than 15, or more than 10?

A. Oh, yes.

X-Q. 449. Did you run it any nights?

A. I would not say that.

X-Q. 450. Well, you might?

A. I might, if you say so.

X-Q. 451. I don't say so. Say it yourself. Fifteen or 16 completed fan blades which you made represent only a part of a day's work?

A. If the operator worked at it continuously, it is altogether likely it would represent nights and days.

X-Q. 452. It might be done in an hour?

A. I don't think so.

X-Q. 453. Could you weld them in an hour?

A. I would not say that.

X-Q. 454. What do you think?

A. If I had an up-to-date equipment, I could.

X-Q. 455. Could you weld them in that time in that machine?

A. I should say not.

X-Q. 456. Why do you say not?

A. Because it would over-heat that machine.

X-Q. 457. You could do it except for over-heating the machine?

A. Yes, sir, I believe if I handled them as fast as we handled them this morning, I believe I could.

X-Q. 458. Suppose you handled it as fast as you handled this machine, how many could you handle in an hour?

A. Oh, I should say I could do 10 or 12 or 15.

X-Q. 459. In an hour?

A. Yes, sir, I should say so.

X-Q. 460. That would be four minutes to each one?

A. Yes, sir.

X-Q. 461. And there are 12 spot welds to be made on each one?

A. Yes, sir.

X-Q. 462. And you would use the little jigs you used this morning to hold the blade in position?

A. Yes, sir.

X-Q. 463. Did you have that in 1901?

A. Not that one. I had one of practically the same type, I would say.

X-Q. 464. Did you tell Mr. Howe that?

A. I don't remember.

X-Q. 465. Did you tell Mr. Howe you completed four blades for fans?

A. I don't remember that part either.

X-Q. 466. Did you tell Mr. Howe that any of these completed spot-welded fans and spiders went into assembled fans?

A. I won't say definitely as to that, but my impression is I think I did.

X-Q. 467. You think you did?

A. Yes, sir.

X-Q. 468. Now, do you remember your affidavit that you made?

A. I remember making an affidavit.

X-Q. 469. And in that affidavit you stated the facts as you understood them, or did you intend to deceive in that affidavit?

A. No, I did not. I may have stated facts as they occurred to me at that time. If my memory was refreshed in what I had done the year before——

X-Q. 470. What would refresh your memory since then?

A. I have looked up the various operators we had, looked the stock over, studied the machine more.

X-Q. 471. You have studied the machine more?

A. Yes, sir.

X-Q. 472. When did you study the machine?

A. I have studied various types in the last year.

X-Q. 473. I say when?

A. I could not say.

X-Q. 474. The last year, 1917?

A. I would say I have, yes, sir, during the last year.

X-Q. 475. Did you have your machine at your factory in 1917?

A. Yes, sir.

X-Q. 476. How long?

A. I could not say definitely.

X-Q. 477. That is only a year ago; you ought to be able to remember that. What month was it in?

A. I cannot tell you that.

X-Q. 478. Your memory is good for 18 years, but not good for two years? Is that it?

A. On particular items, and when I refer to correspondence, I could locate very close to the length of time I have had the machine.

X-Q. 479. Two years ago?

A. Yes, sir.

X-Q. 480. I wish you would try to locate the exact time when you had the machine in the company's plant in 1917? The exact date it was shipped from there.

A. Where it was shipped to?

X-Q. 481. Where was it shipped?

A. It was shipped to Canton at one time.

X-Q. 482. Did it come back from Canton?

A. Yes, sir.

X-Q. 483. Did it come back the same year?

A. I will not say.

X-Q. 484. It came back in the year 1918?

A. It didn't.

X-Q. 485. Did it come back in the year 1919?

A. It did.

X-Q. 486. What time?

A. About two weeks ago, I would say.

X-Q. 487. All that time, between whenever it went from your factory to Canton, and now, it has been out of your possession until recently? Until the last two weeks?

A. Whenever it went, it has been out of my possession until it was brought back to Warren recently.

X-Q. 488. Now, if you can, I would like to have you refresh your recollection as to when it was shipped to Canton.

A. I cannot do that here. I have no records here with reference to the shipment of the machine to Canton.

X-Q. 489. When it was at the National Electric Welder Company at—where is the National Electric Welder Company?

A. Warren, Ohio.

X-Q. 490. —at Warren; how many months was it there?

A. Well, I am not in position to say.

X-Q. 491. Why not?

A. Because I would have to check up the date it was delivered to me and check up the date it was shipped.

X-Q. 492. Can you tell me how many months it was there?

A. No; you are asking me to make a definite statement on months, and I am not in position to make such a definite statement.

X-Q. 493. Was it three months?

A. I would not say.

X-Q. 494. Was it four months?

A. Yes, sir.

X-Q. 495. Six months?

A. Yes, sir.

X-Q. 496. Was it seven months?

A. Yes, sir.

X-Q. 497. Was it eight months?

A. Yes, sir.

X-Q. 498. Was it nine months?

A. Yes, sir.

X-Q. 499. Was it ten months?

A. Yes, sir.

X-Q. 500. Was it 12 months?

A. Yes, sir.

X-Q. 501. It was there 12 months in the year of 1917?

A. No, I didn't say that; you didn't mention 1917. You asked me how many months it was there from the time it was brought there.

X-Q. 502. In the year 1917 how many months was it there?

A. I cannot say.

X-Q. 503. Was it there one month?

A. I could not say.

X-Q. 504. Can't you remember two years ago how many months that machine was in your factory in Warren?

A. No, I cannot make a statement like that.

X-Q. 505. While it was in your factory in 1917, did you do any spot welding on it?

A. I did.

X-Q. 506. What did you weld then?

A. I welded some fan blades.

X-Q. 507. On the spiders?
A. Yes, sir.
X-Q. 508. And to whom did you show that operation?
A. I think I showed that operation to Mr. Pattison.
X-Q. 509. Anybody else?
A. Yes, sir.
X-Q. 510. Who?
A. Several of them.
X-Q. 511. Who?
A. That is difficult to say. I think I have shown it to Captain Smith and one of your representatives, Newton A. Smith. I cannot say exactly; it was no secret that we had the machine, or that it could be used for welding.
X-Q. 512. You had at the same time other spot welding machines in your factory, the National, had you not, in 1917?
A. I would say we had.
X-Q. 513. Did you do any spot welding on those at that same time?
A. I did.
X-Q. 514. Did you weld any fan blades to fan spiders on those machines?
A. I would not say I did.
X-Q. 515. Or you would not say you didn't?
A. No.
X-Q. 516. You might have?
A. Yes, sir.
X-Q. 517. And you showed those fan blades you might have welded on those machines to Mr. Pattison?
A. I won't make a definite statement on that. I would not say clearly on that.
X-Q. 518. Where did the transformer of this machine come from?
A. It came from the transformer department of the Warren Company of Warren, Ohio.
X-Q. 519. Had that transformer ever been to Freehold?
A. The records indicate it did.
X-Q. 520. What records?
A. The old original transformer record of the Warren Company.
X-Q. 521. You mean the McCurdy book?
A. No.
X-Q. 522. Mr. McCurdy prepared it?
A. He is the man that produced that book from the files of the Enterprise Electric Company of Warren.
X-Q. 523. Did the Warren Company make any other transformer about that time, the first part of 1901, as far as working for this electric welding job?
A. Yes, sir.
X-Q. 524. Is that the transformer?

A. No, that is not the one. That is not the second transformer.

X-Q. 525. That is not the one that was made the latter part of 1900?

A. No, that was made in June.

X-Q. 526. And this transformer is the one that went to the Freehold plant? This went there and the other went there also?

A. Yes, sir.

X-Q. 527. This is the one that came back from Freehold?

A. Yes, sir.

X-Q. 528. It is not the one that stayed at Freehold?

A. No, it is not.

X-Q. 529. And it is the one that Mr. McCurdy testified to in this case?

A. I don't know what Mr. McCurdy testified to. You will have to excuse me from testifying on that.

X-Q. 530. Haven't you read his testimony?

A. No.

X-Q. 531. As I recall it, a transformer was sent to Freehold to the Pneumatic Wheel Company some time in June, 1900, and it came back some time in January, 1901, and according to the record, it was sent to the fan motor department January 20th, 1901. Does that accord with your recollection?

A. No. Did Mr. McCurdy testify that way?

X-Q. 532. Does that accord with your recollection?

A. Not that statement, it does not.

X-Q. 533. When did it come back?

A. I am not in a position to say.

X-Q. 534. How is that statement incorrect?

A. I don't think Mr. McCurdy made the statement that the transformer came back in January, 1901.

X-Q. 535. Did you agree with him it was delivered to the fan motor department January 20th, 1901?

A. According to the record.

X-Q. 536. And it came back from Freehold then?

A. I don't know.

X-Q. 537. It came back before January 20th, 1901?

A. It must have.

X-Q. 538. And subsequent to June?

A. Yes, sir.

X-Q. 539. And it came back after Mr. Craft went there, did it?

A. I understand it must have.

X-Q. 540. When did Mr. Craft go there?

A. I am not in a position to say definitely.

X-Q. 541. Do you recollect his going?

A. I recall the time when Mr. Craft was with us. I know he was with us during that time.

X-Q. 542. And it was after January 20th, 1901, you fitted up this machine with this transformer to do butt welding?

A. Yes, sir.

X-Q. 543. And that was the first time you had done any butt welding in the Warren plant?

A. To my knowledge.

X-Q. 544. Now, how many turns are there in the primary of that transformer?

A. I am not in a position to say.

X-Q. 545. How many turns in the secondary?

A. There are four turns in the secondary.

X-Q. 546. Do you know what kind of wire is used in the primary?

A. Nothing more than as my recollection serves me, the machine is wound with No. 12 square.

X-Q. 547. No. 12?

A. I won't say for sure.

X-Q. 548. How was it in this actual machine?

A. I don't know. I had nothing to do with the wrapping.

X-Q. 549. Did you ever change that transformer after it came back?

A. In respect to what?

X-Q. 550. With respect to any part?

A. No.

X-Q. 551. With respect to the winding of the primary?

A. No.

X-Q. 552. Is it in the same condition it was when it came back from Freehold?

A. I cannot say.

X-Q. 553. Did you change it after it came back from Freehold?

A. I am not in a position to say that.

X-Q. 554. Do you know of any change?

A. Not to my knowledge.

X-Q. 555. So far as you know, it is identically as it was when it came back from Freehold?

A. So far as I know.

X-Q. 556. So far as you know, it is identically the same as it was when it went to Freehold?

A. Yes, sir.

X-Q. 557. Now, it was used this morning with a voltage across the terminals of the welder of 4½ volts?

A. Yes, sir.

X-Q. 558. Is that the same voltage you used in your work at Warren on the fan guard rings?

A. That is a question I cannot answer definitely for the reason I had no low volt meter, a volt meter of the proper calibre to read the voltage of the secondary on this motor.

X-Q. 559. You had none with you now or at that time?

A. I never had.

X-Q. 560. I notice on this machine there were several taps on the primary.

A. Yes, sir.

X-Q. 561. And as on a transformer the primary was connected to the four volt taps; did you notice that?

A. I did not notice that.

X-Q. 562. Was it connected with the same taps they used in Warren?

A. I could not say.

X-Q. 563. Why can't you say?

A. Because I have not looked it over; I have not paid attention to it with reference to that particular action.

X-Q. 564. But it is the same transformer that went to Freehold?

A. I won't say that is the same transformer that went to Freehold. The records indicate it is.

(The Court: Have you any personal recollection of it?)

A. My present recollection is that the transformer was turned over to the fan department by the transformer department for that job, and I was not in the transformer department; that was handled by Henry W. Wiswell.

X-Q. 565. How wide was the insulation between the two clamp pieces when you used the machine for butt welding in 1900?

A. I would say three-eighths of an inch, and that is a guess.

X-Q. 566. That is narrower than it is now?

A. Yes, sir.

X-Q. 567. How much narrower?

A. I think it is very close to three-eighths of an inch narrower.

X-Q. 568. So it is double the distance now that it was?

A. I would not say that. My recollection is it was three-eighths of an inch before.

X-Q. 569. And about three-quarters of an inch now?

A. I think so. I have not measured it.

X-Q. 570. Now, that was when it was used for butt welding; when you used it for spot welding, did you change the separation of the plates?

A. Yes, sir.

X-Q. 571. Took out the fibre and put in another one?

A. Took out the fibre and put in a wide space in there.

X-Q. 572. What else did you do to accomplish the result? Did you change the machine in any way?

A. I shortened up the fibre so that the space between the front of the machine beyond the clamping die was free, extending it down through that opening.

X-Q. 573. Did you move the plates on the bench?

A. I would not say as to that. You mean the entire machine?

X-Q. 574. No. I mean one side or the other.

A. I would not say. The chances are when you spread it out you would have to move the plates.

X-Q. 575. But you don't recollect of moving the plates?

A. I don't recollect. I was not there.

X-Q. 576. Do you remember whether you bored holes in the bench to bolt the plates?

A. That would be turned over to some mechanic to attend to.

X-Q. 577. You were making experiments yourself?

A. Yes, sir.

X-Q. 578. And were giving instructions as to how changes were to be made?

A. Yes, sir.

X-Q. 579. Instructions as to the changing of the fibre?

A. Yes, sir.

X-Q. 580. Instructions as to moving the bottom plate?

A. Yes, sir.

X-Q. 581. So you would know whether they were done or not when you came to view the machine?

A. I would certainly see that part of it.

X-Q. 582. And you would move it about three-eighths of an inch?

A. I think about that.

X-Q. 583. Did they move one or both plates?

A. I don't know.

X-Q. 584. What do you think?

A. I could not say that.

X-Q. 585. You don't recall?

A. No.

X-Q. 586. Now was the machine used with the bent-up electrodes with the bed plates three-eighths of an inch apart?

A. Yes, sir, it was.

X-Q. 587. Was it used with straight electrodes three-eighths of an inch apart?

A. For some small work, just as I made a demonstration of what could be done in welding.

X-Q. 588. Now, you left the Warren Company in what year?

A. Nineteen hundred and two.

X-Q. 589. And where did you go?

A. I went to work for the Peerless Electric Company.

X-Q. 590. That was a continuation of the Warren Company, was it not?

A. No.

X-Q. 591. So far as the place, the building, was concerned?

A. It continued in the manufacture of fans, and under the new administration of the Peerless Electric Company.

X-Q. 592. When was that change made? What time in 1902?

A. Some time in 1902, but I was not familiar with its office affairs, and consequently I am not in a position now to make a definite statement as to that.

X-Q. 593. Did they put out these same types of fans?

A. They did.

X-Q. 594. With the blades riveted to the spiders?

A. Yes, sir.

X-Q. 595. That was the regular output?
A. That was at that time.
X-Q. 596. The Colonial Fan, who put that out?
A. The same firm.
X-Q. 597. Was that made in the same way as the other?
A. Yes, sir.
X-Q. 598. With steel blades?
A. The same.
X-Q. 599. And with steel guard rings?
A. Some of them.
X-Q. 600. Did the Colonial fans that had steel guard rings have steel blades?
A. Not always.
X-Q. 601. Was there any regularity about that?
A. Not any great amount of it.
X-Q. 602. You mean they used whatever they happened to have?
A. They used whatever they thought they could use to advantage.
X-Q. 603. Was that true also of this Peerless G-2 fan?
A. Yes, sir. In reference to the G-2 we called them steel blades and steel centers.
X-Q. 604. And how was the Colonial fan made up?
A. The high grade fans had some brass blades and some steel blades with brass centers, some centers of steel and some brass centers.
X-Q. 605. Did you do any of this spot welding in 1902?
A. No, not to my knowledge.
X-Q. 606. When was the last time you did any spot welding?
A. I could not say.
X-Q. 607. In 1900 and 1901, anyhow?
A. I would not say offhand; some in 1901.
X-Q. 608. Could you give any month?
A. No.
X-Q. 609. Did you do any butt welding, say, after May 1st?
A. I would not say.
X-Q. 610. You cannot say you did any after May 1st? Will you put it that way? Will you swear you did make spot welds on that machine after May 1st, 1901?
A. I will not.
X-Q. 611. So that you do not feel definite about that?
A. No.
X-Q. 612. Now, how about April 1st? Will you swear you made spot welds on that machine after April 1st, 1901?
A. No, sir.
X-Q. 613. Will you swear you made spot welds on that machine after March 1st, 1901?
A. No, I would not swear to that.
X-Q. 614. Are you willing to swear you made spot welds on that machine after February 1st, 1901?

A. Yes, sir.

X-Q. 615. Will you swear you made spot welds on that machine before January 1st, 1901?

A. No, sir.

X-Q. 616. Will you swear you made spot welds on that machine before February 1st, 1901?

A. No, sir.

X-Q. 617. Then it comes down to this, that what you will actually swear to is that you won't swear you made spot welds on that machine after March 1st, 1901?

A. No.

X-Q. 618. And you won't swear you made them before February 1st, 1901?

A. No.

X-Q. 619. By "no" you mean I am right?

A. I mean I won't swear I did any spot welding before February 1st, 1901.

X-Q. 620. Will you swear you did spot welding after March 1st, 1901?

A. No.

X-Q. 621. But you will swear that between February 1st and March 1st you did spot welding?

A. Yes, sir.

X-Q. 622. And that is all you will swear to, as far as the dates are concerned?

A. That is all I will swear to in this particular instance here.

X-Q. 623. Of course; and you understand you are under oath here?

A. Yes, sir.

X-Q. 624. And swearing to the truth?

A. Yes, sir.

X-Q. 625. Now, after 1902, where were you employed?

A. At the Peerless Electric Company.

X-Q. 626. For how long?

A. Until 1906.

X-Q. 627. Was this machine employed during that time?

A. Yes, sir.

X-Q. 628. And for what purpose?

A. Welding fan guard rings.

X-Q. 629. But not any blades or spiders?

A. Not to my knowledge.

X-Q. 630. And what was your position?

A. I was superintendent of the Peerless Electric Company.

X-Q. 631. You would have known about it if they had?

A. Not necessarily.

X-Q. 632. They might have done it secretly?

A. No. It might have gone through the shop for weeks at a stretch and I not know it.

X-Q. 633. As superintendent, you would not know it?

A. No, as superintendent, I would not know it.

X-Q. 634. And you stayed with the Peerless Company until when?

A. Until 1906, I think.

X-Q. 635. Then where did you go?

A. Then I went into business myself.

X-Q. 636. What business?

A. The manufacture of transformers.

X-Q. 637. So you know something about transformer manufacture?

A. Yes, sir.

X-Q. 638. Is that the first time you really became what might be called familiar with transformer manufacture?

A. Oh, no, I had been gathering information on the transformer business right along in my experience in the transformer department.

X-Q. 639. And from 1906, when did you next see this welding machine?

A. The next definite knowledge of seeing this welding machine was the latter part of 1911.

X-Q. 640. And between that time, so far as you know, where had it been?

A. At the plant of the Peerless Electric Company.

X-Q. 641. Had you visited that plant in the meantime?

A. Occasionally.

X-Q. 642. Did you know their output in the way of fans?

A. Yes, sir; they were producing fans, I know.

X-Q. 643. You know they were producing electrically welded guards on the fans?

A. I had no definite knowledge of that.

X-Q. 644. You did not know of that?

A. No.

X-Q. 645. The next time you saw the machine was in 1911?

A. Yes, sir.

X-Q. 646. Do you remember what month of the year?

A. I would not say what month; in the late fall or early winter of 1911.

X-Q. 647. Did you buy it yourslf?

A. Yes, sir.

X-Q. 648. Why did you buy it?

A. I thought it might be of advantage to me in a later transaction.

X-Q. 649. In a later transaction?

A. Yes, sir.

X-Q. 650. What kind of a transaction?

A. In case of somebody's wanting to know what had been done in the electric welding line in the early days.

X-Q. 651. So that in 1911 you had a very good idea of what you had done in your early days?

A. Yes, sir.

X-Q. 652. And those ideas were still in your mind in 1913, were they not?

A. Yes, sir.

X-Q. 653. They had not escaped at that time?

A. No.

X-Q. 654. And you had that machine in your possession then?

A. Yes, sir.

X-Q. 655. When Mr. Howe came there?

A. Yes, sir.

X-Q. 656. Was it connected up with the transformer it is now furnished with?

A. I think it was connected up.

X-Q. 657. And you showed Mr. Howe some spot welding?

A. I think I did.

X-Q. 658. That would be the natural thing to do?

A. That would be the natural thing for me to do.

X-Q. 659. And when you bought that machine, you also bought the transformers?

A. I Bought the entire equipment.

X-Q. 660. And when you bought them, how were they connected up?

A. When I bought them, they were not connected together.

X-Q. 661. They were not?

A. No.

X-Q. 662. What was the Peerless Company doing with it? Anything?

A. They were in the garret of the Peerless Company.

X-Q. 663. And they were separated?

A. Yes, sir.

X-Q. 664. Were the two parts separated?

A. No, they were attached together.

X-Q. 665. How were they attached together?

A. They were attached to a face plate.

X-Q. 666. And that has been removed?

A. Yes, sir.

X-Q. 667. Why did you take that off?

A. Because we could not put it in the shape it was in when we did our spot welding, with that slate base.

X-Q. 668. So far as you know, had the Peerless Company used them with the slate base?

A. They had used it for a while, I am confident.

X-Q. 669. Did that slate base run all the way under the plates?

A. Yes, sir.

X-Q. 670. So that there was no hole in between the metal so that you could put a fan blade in?

A. I don't believe you could put a fan blade in between. I would not say definitely on that situation.

X-Q. 671. Did you tell Mr. Howe that you found it on a slate base?

A. I would not say definitely as to that.

X-Q. 672. But you told him you bought it in 1911 of the Peerless Company?

A. I won't say definitely as to that.

X-Q. 673. But you do recall making some spot welds for him?

A. No, I don't.

X-Q. 674. I thought you said a moment ago you did?

A. No, I said I might.

X-Q. 675. But you do recall making spot welds in 1901?

A. Yes, sir.

X-Q. 676. But not when Mr. Howe came to see you?

A. No.

X-Q. 677. Your recollection is better for the 18-year period than it is for the six-year period?

A. Yes, sir.

X-Q. 678. Now, what did you do with it in 1911?

A. I did not do anything with it in 1911.

X-Q. 679. Just bought it?

A. Bought it and kept it.

X-Q. 680. Bought it to refresh your recollection?

A. No, bought it for the sake of a future use if I found it desirable to have it for information.

X-Q. 681. I don't quite get your idea of future use. I would like to have you tell me what you mean by future use.

A. If somebody wanted me to demonstrate what I had done in the early days in the spot welding line, that machine would enable me to do it.

X-Q. 682. Of course, when Mr. Howe came to you, you demonstrated it?

A. I did not say so.

X-Q. 683. But you bought it for that purpose?

A. No.

X-Q. 684. You just said you bought it for demonstration?

A. Yes, sir.

X-Q. 685. But not demonstration for Mr. Howe?

A. No.

X-Q. 686. How long did you keep it after you bought it in 1911?

A. I can not say that.

X-Q. 687. When did you first make use of it after 1911?

A. I don't know as I used it until 1913. I believe I set it up to see if the electric connections were all right, and tested it out.

X-Q. 688. And when you bought it, you said it was on the same base. When did you first put it on this dirty, old board?

A. That was put on the so-called dirty old board in 1917, I guess.

X-Q. 689. The rest of the primary is nice and clean. Why put it on that dirty board?

A. Probably because we had no other hard wood handy.

X-Q. 690. Why did you want a hard wood board?

A. Because it was dry and solid.

X-Q. 691. Was it on hard wood there in the Warren Company's factory?

A. My recollection is it was on a heavy maple bench.

X-Q. 692. Of about the same thickness?

A. I could not say.

X-Q. 693. Was it on slate?

A. It had a cut in it for the bottom of the machine that it set in.

X-Q. 694. How long was that?

A. I could not say.

X-Q. 695. An inch thick?

A. I could not say.

X-Q. 696. Two inches?

A. I don't say.

X-Q. 697. How thick was the cut?

A. I don't say.

X-Q. 698. Was the cut three inches long?

A. I would not say.

X-Q. 699. Was it four inches long?

A. I would not say.

X-Q. 700. Was it six inches long?

A. I would not say.

X-Q. 701. Was it four inches long?

A. I would not say that either.

X-Q. 702. You don't recall that?

A. I recollect there was a cut in the bench.

X-Q. 703. But you don't know whether it was an inch long, or a foot long?

A. No, when it comes to making a definite statement like that, I would not say.

X-Q. 704. Was it two feet long?

A. No, I think not, because I don't think the board was that wide.

X-Q. 705. Will you deny it was a foot long?

A. I won't make any statement on that.

X-Q. 706. Will you deny that machine overlapped the edge of the bench as much as it does now?

A. My notion is it was about the same now. That was the intention.

X-Q. 707. Will you swear it was mounted just as it is now?

A. I will not.

X-Q. 708. How far beyond the end of the bench did the plates overlap, that you will positively swear to?

A. I will not positively swear to any distance; I haven't definite information; I can not give that; I am guessing at inches, in distances.

X-Q. 709. Of course, I want you to tell only what you can swear to.

A. I am telling you what I can not swear to.

X-Q. 710. You can not swear it wasn't practically flush with the edge of the bench?

A. The machine was mounted, as far as my recollection serves me, as it was mounted in the early days when first built.

X-Q. 711. Did you tell Mr. Howe how it was mounted?

A. I don't recollect that.

X-Q. 712. You don't recollect that either?

A. No.

X-Q. 713. Your memory about what you told Mr. Howe is very poor?

A. It is.

X-Q. 714. Very poor.

A. Yes, sir.

X-Q. 715. Surprisingly poor.

A. No, not necessarily.

X-Q. 716. Because you knew all the facts in 1913.

A. Not all of them.

X-Q. 717. What facts did you find out since?

A. I can not say that definitely.

X-Q. 718. Tell us what facts you found out since.

A. What particular facts do you want to know?

X-Q. 719. What you did with that machine.

A. Which particular one? Be specific.

X-Q. 720. About the spot welding, all the facts about your method of spot welding that you found out since 1913.

A. That is difficult to say, because I don't know just exactly what I knew in 1913 with reference to what I know now.

X-Q. 721. What have been your additional sources of information as to your work in 1901 which you have had since 1913?

A. Well, in my conversations with operators that worked with that machine, and worked in the same plant, looking over the lay of the building, and referring to different things that were done.

X-Q. 722. Talking with operators and referring to the lay of the building?

A. Yes, sir.

X-Q. 723. What other specific thing?

A. Referring to the work that was done.

X-Q. 724. Spot welding?

X-Q. 725. That machine did weld or produce the guards?

A. Yes, sir.

X-Q. 726. The operators told you they had produced guards—spot welded guards? Is that what they told you?

A. I knew they produced guards.

X-Q. 727. That was not a new fact then?

A. No.

X-Q. 728. What other new facts did the operators tell you?

A. That is difficult to say.

X-Q. 729. Did they tell you that they had seen you do spot welding?

A. These operators told me that—had not told me that before, you mean?

X-Q. 730. Yes.

A. My impression is they did tell me that they had seen me do spot welding.

X-Q. 731. Which ones? Name them.

A. Now, that is a difficult thing to do. I think—well, I can not say either with reference to any particular operator, who has told me he has seen me do spot welding, that told me since 1913 or had not told me that before.

X-Q. 732. What do you mean? What do you mean by operators?

A. Men that worked in the factory.

X-Q. 733. You don't mean operators on this machine?

A. No.

X-Q. 734. You don't restrict it to that?

A. No.

X-Q. 735. Who were the operators on this machine in 1901?

A. That is difficult to say. I personally was not in close contact with the men in the shop any more than with some few that were either heads of departments or men that had been with us for some length of time.

X-Q. 736. Name them the best you can.

A. The operators that I am familiar with, these men that worked in the factory, were such men as Jasper Powers, John Gilder, John McDonald, William E. Smith, Mr. Craft, and there may be others.

X-Q. 737. Let me make a note of who those operators were in the factory—I mean on this machine——

A. No, you asked me who was working in the shop.

X-Q. 738. No, I asked you about this machine. Whatever I asked you, answer this question: What operators operated this 1901 machine you have got here in the year 1901?

A. I don't know as I could identify a single one.

X-Q. 739. You would not swear to any one, you mean?

A. I would not say I could.

X-Q. 740. And yet you were there all the time?

A. I was in the factory.

X-Q. 741. Were you experimenting with this machine?

A. Not much; it was a pretty good sized factory and I had entire charge of it.

X-Q. 742. But you don't know what men were making butt welds on this machine?

A. No.

X-Q. 743. During 1901?

A. No, sir. I may have known them at the time.

X-Q. 744. Did you ever tell Mr. Howe what men were operating this machine in 1901?

A. I don't know as I did. I would want to ask the men who worked there whether they operated it and take their word for it.

X-Q. 745. Do you know now whether copper or iron melts at a lower temperature?

A. Copper melts at a lower temperature than iron.

X-Q. 746. Did you know that in 1901?

A. Yes, I think I did; I would not say definitely I did though.

X-Q. 747. That is almost schoolboy's knowledge to an engineer and designer of machinery?

A. It might be now. I don't know as it was then. I was a machinist in those days.

X-Q. 748. Now, coming back to the early days of this machine, you bought it in 1911, and you bought the transformer with it?

A. Yes, sir.

X-Q. 749. And the two were disconnected, but both in the same tool room?

A. Both were in the same pile of scrap.

X-Q. 750. What?

A. I say both were in the same scrap pile.

X-Q. 751. The transformer was scrapped?

A. It had been laid aside to be scrapped.

X-Q. 752. And this is the very transformer?

A. Yes, sir.

X-Q. 753. And you are able to recognize it?

A. Yes, sir.

X-Q. 754. Now, how do you recognize it? Why should it not be another one?

A. Well, due to the peculiar construction of it.

X-Q. 755. What peculiar construction?

A. The way the square turns are put on the coils.

X-Q. 756. What is peculiar about that?

A. The way they are drawn around in place and held in position.

X-Q. 757. What is peculiar about that?

A. The construction of it. That is all I can say; the particular shape of it. I could possibly make you a drawing and illustrate what I mean but that is all I can say.

X-Q. 758. That is all you can say?

A. I never saw another transformer of that type, the plate in that way.

X-Q. 759. And you say there are four turns on the secondary, and how many convolutions of wire are there?

A. I don't know, unless I count them.

X-Q. 760. You don't remember how many there were, but you remember it was peculiar?

A. Yes, sir.

X-Q. 761. The appearance?

A. Yes, sir.

X-Q. 762. And in the connection?

A. No, there was nothing peculiar about the connection. They are connected in series, the standard connections.

X-Q. 763. Now, the 500 turns on the primary of each leg, or do you mean two legs added together?

A. The record says 500 turns on the primary coil.

X-Q. 764. What does that mean? on each leg?

A. That means 500 turns, and it may be 500 turns on each coil, or 500 all told. I am not in a position to say. I had nothing to do with the winding of it. I have my own opinion about it.

X-Q. 765. What is that opinion?

A. That there was 500 turns on each leg, and they are connected in parallels

X-Q. 766. As a man conversant with the transformer business, would that be the natural way of doing it, the right way of doing it?

A. That would be the way I would build that type of transformer.

X-Q. 767. Now when did you actually use this welder after 1911, either for butt welding or spot welding?

A. I don't know. I would not want to make any definite statement on that.

X-Q. 768. Well, I think you ought to remember that.

A. Why?

X-Q. 769. Well, it is not back far. How about 1911?

A. There was a lot of other things I was doing in those days.

X-Q. 770. Can't you tell me when you first made use of this machine after 1911?

A. No.

X-Q. 771. When did you first hitch it up to the transformer after 1911?

A. I would not want to make a definite statement on that.

X-Q. 772. Can't you tell me the year?

A. No, I won't say whether I did or did not hitch it up as soon as I got it, to find out whether it was electrically all right. I might or might not.

X-Q. 773. Do you recall it?

A. No, I don't.

X-Q. 774. But you do recall taking it to the National Company's works in 1911, and you do recall using it in 1917. You do recall about using it for welding, hitched up with this transformer in 1917, do you?

A. I recall using it, but I would not want to tie myself down to 1917.

(The Court: Was it in 1917?)

(The Witness: I would not say that definitely, somewhere about that time. The machine was there, and the actual time does not stick in my memory. I have nothing to identify that date.)

X-Q. 775. Now if you had not that exhibit with the date marked on it, how would you fix February, 1901, as the date you did spot welding?

A. If I was going to fix the date irrespective of that, I would

have said it was very shortly after we got the little machine in operation.

X-Q. 776. And that date also you fix by the date in the transformer book?

A. Yes.

X-Q. 777. What other circumstances?

A. The fact we had men working there that also had a recollection.

X-Q. 778. I mean of your own recollection.

A. Then the fact of the purchases along that time would indicate that also, purchases of stock.

X-Q. 779. That would be in February, too?

A. Not necessarily, but somewhere very close to that time.

X-Q. 780. How does this happen to be cut off, the top of this Exhibit M?

A. That would indicate that either I wanted a piece of material of that kind for some use in the early days, or possibly——

X-Q. 781. It strikes me as rather funny to cut off a piece of specimen you highly prize, because you could not find another piece of metal of that kind.

A. No, the prize specimen is all there; some excess of metal is of no particular advantage.

X-Q. 782. And you wanted a little piece of metal and you just cut that piece off instead of picking a piece up from the floor or table? Is that it?

A. Sometimes you can not pick up these pieces.

X-Q. 783. When was the top of that cut off?

A. I am not in position to say.

X-Q. 784. How long was it in your tool box after you put it there in 1901?

A. It must have been in my tool box until some time along in 1911 or 1912.

X-Q. 785. Why do you say 1911 or 1912?

A. It was along about that time; I can not identify the actual date that it was dug up in there. That is, that we found it desirable to have that sample for information, but it was there all that time.

X-Q. 786. What occurred in 1911 or 1912 that made you take this out of the tool box?

A. The matter—other information came up in connection with the subject of electric spot welding.

X-Q. 787. But you got it out for Mr. Howe?

A. I don't remember whether I got it out for Mr. Howe or some one else.

X-Q. 788. Well, who else?

A. Well, there was Mr. J. Nota McGill and Mr. White of the General Fireproofing Company of Youngstown.

X-Q. 789. He was also interested in the same proposition?

A. Yes, sir.

X-Q. 790. And it all came along about the same time as the Barney & Berry suit?

A. I would not say. I think not. I think this matter had been brought to my attention with reference to some litigation earlier than that. There had been other litigation with reference to spot welding.

X-Q. 791. Did you show this to Mr. Howe?

A. I think not.

X-Q. 792. Did you have it at that time?

A. I think I did.

X-Q. 793. Why didn't you show it to Mr. Howe?

A. I had definite instructions to keep that thing to myself.

X-Q. 794. Who told you that?

A. Mr. White of the General Fireproofing Company.

X-Q. 795. So you kept this thing absolutely under your own hat?

A. Absolutely under my own hat.

X-Q. 796. And you put the date on it under your own hat, so to speak, without telling anybody about it?

A. No; that date is on there. I don't know as there is any particular secret about that. That was there.

X-Q. 797. Did anybody else say to you to put that date on? Of course, that might have been done yesterday or the day before.

A. It might have been.

X-Q. 798. You say it might have been done yesterday or the day before?

A. Yes, sir.

X-Q. 799. Why do you say that?

A. Because it is not a difficult thing to put a date mark on a thing of that kind.

X-Q. 800. It bruises the metal to put a stamp on in that way?

A. Yes, sir, unless you put it on something smooth.

X-Q. 801. What steps did you take to prevent rust from collecting?

A. Not any.

X-Q. 802. Has it rusted any since that year?

A. I can not tell.

X-Q. 803. No rust has collected on it for 17 years?

A. There isn't any rust on any tools in my tool box.

X-Q. 804. But you use the tools in your tool box?

A. No.

X-Q. 805. You do not use the tools?

A. No, they lay there.

X-Q. 806. Isn't that a remarkably bright specimen for 17 years old?

A. No.

X-Q. 807. No rust on it at all?

A. I don't say there is no rust on it, but I noticed it yesterday, and there was apparently no rust on it.

X-Q. 808. You kept it in your tool box all that time?
A. Yes, sir.
X-Q. 809. Was it wrapped up?
A. No, sir.
X-Q. 810. Just loose?
A. Just loose in the bottom of the box.
X-Q. 811. Loose in the bottom of the box?
A. Yes, sir.
X-Q. 812. Other tools on top of it?
A. Yes, sir.
X-Q. 813. The other tools on top might have scratched it?
A. Might have.
X-Q. 814. But didn't?
A. Apparently not.
X-Q. 815. That was lucky. Now you said this had two blades welded on it?
A. It had a complete center, with another blade on it.
X-Q. 816. And that blade was given to whom?
A. J. Nota McGill.
X-Q. 817. What is the date of that?
A. No date on it that I know of.
X-Q. 818. No date on the other center?
A. I think not.
X-Q. 819. Did you tell him about this piece when you told him about the other?
A. He saw that. I don't remember whether I told him anything about it or not.
X-Q. 820. Did you tell him what those figures meant "2-15-01"?
A. I would not say anything definitely about that.
X-Q. 821. Do you think he could understand those figures if he saw them?
A. Yes, I believe he could.
X-Q. 822. But you concealed this from Mr. Howe?
A. I did.
X-Q. 823. Purposely?
A. Yes, sir.
X-Q. 824. Why was that?
A. On direct instructions we should keep that sample to ourselves, because any sample which was the last sample we had, and our only marking or identification, if it got out of our hands, we were done for, so far as that is concerned.
X-Q. 825. Did you mark any other samples on that date?
A. Not to my knowledge.
X-Q. 826. You think this is really the first sample you made?
A. No, I would not say it is.
X-Q. 827. Was this sample made with bent-up electrodes, or with straight electrodes?
A. No, that was made with straight electrodes. You could not apply much pressure with bent-up electrodes.

X-Q. 828. And in making your spot welds, that you say you made in 1901, did you operate the clamps in the same way that the workman operated the clamps when he was doing the spot welding?

A. We did at that time.

X-Q. 829. And that operation consisted of taking hold of the levers and moving them, moving the parts toward one another?

A. Moving the movable jaws toward each other.

X-Q. 830. Moved both jaws?

A. They can move both jaws or one jaw.

X-Q. 831. How did you do it?

A. I could not say definitely.

X-Q. 832. Do you remember how the workman did it?

A. In making butt welds?

X-Q. 833. Yes.

A. No, I don't. That was entirely up to the workman.

X-Q. 834. What other person besides yourself made spot welds on this machine in 1901?

A. I think Mr. Jasper Powers did, and I don't know, I think Captain William Smith did. I don't believe Mr. Gilder did. And I think Mr. E. C. Lipps did.

X-Q. 835. Anybody else?

A. Not that I can recollect.

X-Q. 836. Will you swear that those men made those welds in any other month than February, 1901?

A. I will not.

X-Q. 837. And were those men operating the machine to make spot welds in the ordinary operation the way the machine was being used regularly?

A. That is what this would do; I would imagine it would be done in the regular process. I don't imagine they welded any fan blades.

X-Q. 838. They might have made some samples? Is that the idea?

A. They might have made samples, picked up the materials and spot welded them together.

X-Q. 839. Did you tell Mr. Howe who did that work?

A. I don't remember as to that.

X-Q. 840. When Mr. Howe came to see you, did you willingly conceal from him information about your work in 1901?

A. I did.

X-Q. 841. You willingly concealed it?

A. Yes, sir, I willfully concealed the fact that we had that sample.

X-Q. 842. Anything else that you willfully concealed from him?

A. Not to my knowledge.

X-Q. 843. You laid yourself open frankly and told him the whole story?

A. I told him just what the situation was.

X-Q. 844. And practically the same story you told today and yesterday on the witness stand?

A. Yes, sir.

X-Q. 845. Because you recollect some things better now than you did then?

A. The chances are I did, and the chances are I recall less. It is a long time between 1913 and 1919, and there are a lot of things that happened in the meantime.

X-Q. 846. I appreciate that.

Court then adjourned to 9:30 A. M. next day.

Wednesday, May 21st, 1919, 9:30 A. M.

(Mr. Stackpole: The plaintiff introduces and asks to be filed the depositions taken out of court on behalf of plaintiff, viz., the depositions of James H. Gravell, George W. Knapp, William A. Herring, Charles F. Tischner, Charles H. Schwing, Charles J. Timms, William B. Heron, Sol Richmand, Robert W. Clark, Herman Lemp, the second deposition of George W. Knapp, the second deposition of William A. Herring, and George W. Knapp, Jr.)

We introduce also the following exhibits which have been offered in connection with those depositions, and the interrogatories already filed in the court.

Plaintiff's Exhibit No. 1, picture of defendant's welder attached to interrogatories.

Exhibit No. 2, spot welded tube attached to interrogatories.

Exhibit No. 3, copy of certificate of incorporation of electric welder company.

Exhibit No. 4, certificate of change in name of electric welder company to Thomson Electric Welder Company.

Exhibit No. 5, Harmatta patent in suit.

Exhibit No. 6, title papers of Harmatta patent in suit.

Exhibit No. 7, Gravell specimen of Ford welding.

Exhibit No. 8, drawings of machine body acquired by the National Company from Silesia for A. B. C.

Exhibit No. 9, Thomson spot Welder bulletin.

Exhibit No. 10 A and 10 B, sample electrode of plaintiff's spot welding machine.

Exhibit No. 11, list of licensed spot welder machine.

Exhibit No. 12, plaintiff's translation of German patent to Benardos, No. 50,909.

Exhibit No. 13, chart showing comparison of Harmatta's patent No. 1,046,066 with the previous art.

Exhibit No. 14, Harmatta assignment.

Exhibit No. 15, copy of Silesia Thomson contract.

Exhibit No. 16, Silesia agreement with the National Enameling Company, December 3, 1904.

Exhibit No. 17, Heron memorandum book.

Exhibit No. 18, specimen of spot welding prepared by Clark.

Exhibit No. 19, de Ferranti patent No. 906,400.

The other exhibits have been offered during this hearing, your Honor.

(Mr. Church: May I make a similar offer of the defendant's exhibits?)

Defendant offers in evidence the stipulation in regard to copies of defendant's taking of depositions under Section 863 R. S. U. S.; the following depositions that are printed in Volume I of defendant's printed record, designated as follows:

Deposition of William E. Smith;

Deposition of Elihu Thomson;

Deposition of Frank L. Dyer;

Deposition of Charles F. Tischner;

Deposition of Henry C. Townsend;

Deposition of Adolph F. Reitzel;

Stipulation introducing certain depositions and exhibits in Thomson Spot Welder Co. v. Houghton & Dutton, et al., into Thomson Spot Welder Co. v. Ford Motor Co.

Deposition of John B. Estabrook;

Deposition of Pearl M. Long;

Deposition of George B. Sawyer;

Deposition of Charles B. McCurdy;

Deposition of Fred W. Roberts;

Deposition of Howard A. Coombs;

Deposition of William Friess;

Also, the following defendant's exhibits, printed in Volume II of defendant's record, and designated as follows:

Exhibit No. 1, U. S. Patent to Thomson No. 347,140;

Exhibit No. 2, U. S. Patent to Thomson No. 347,141;

Exhibit No. 3, U. S. Patent to Benardos No. 363,320;

Exhibit No. 4, U. S. Patent to Thomson No. 396,015;

Exhibit No. 5, U. S. Patent to Dewey No. 432,727;

Exhibit No. 6, U. S. Patent to Coffin No. 437,571;

Exhibit No. 7, U. S. Patent to Thomson No. 444,928;

Exhibit No. 8, U. S. Patent to Blanchard No. 466,266;

Exhibit No. 9, U. S. Patent to Thomson No. 496,019;

Exhibit No. 10, U. S. Patent to Lemp No. 531,197;

Exhibit No. 11, U. S. Patent to Lemp No. 553,923;

Exhibit No. 12, U. S. Patent to Robinson No. 574,942;

Exhibit No. 13, U. S. Patent to Kleinschmidt No. 616,436;

Exhibit No. 14, U. S. Patent to Burton No. 647,694;

Exhibit No. 15, U. S. Patent to Perry No. 670,808;

Exhibit No. 16, U. S. Patent to Hunter No. 690,958;
Exhibit No. 17, U. S. Patent to de Ferranti No. 874,398;
Exhibit No. 18, U. S. Patent to Rietzel No. 928,701;
Exhibit No. 19, U. S. Patent to de Ferranti No. 1,148,221;
Exhibit No. 20, Certified Copy of British patent to Parkinson No. 14,536 of 1894;
Exhibit No. 21, Certified Copy of British patent to de Ferranti No. 11,921 of 1903;
Exhibit No. 22, Certified Copy of British patent to Harmatta No. 22,981 of 1903;
Exhibit No. 23, Certified Copy of French patent to Egel No. 335,889;
Exhibit No. 24, Translation of French patent to Egel No. 335,889;
Exhibit No. 25, Certified Copy of French patent to Egel No. 336,187;
Exhibit No. 26, Translation of French patent to Egel No. 336,187;
Exhibit No. 27, Certified Copy of German patent to Benardos No. 50,909;
Exhibit No. 28, Translation of German patent to Benardos No. 50,909;
Exhibit No. 29, Copy of Harmatta U. S. application as filed December 3, 1903;
Exhibit No. 30, Certified Copy of file wrapper and contents of de Ferranti U. S. patent No. 1,148,221;
Exhibit No. 31, Certified Copy of file wrapper and contents of de Ferranti U. S. application Serial No. 688,464;
Exhibit No. 32, Certified Copy of file wrapper and contents of Harmatta U. S. patent No. 1,046,066;
Exhibit No. 33, Certified Copy of file wrapper and contents of Interference No. 36,709, de Ferranti vs. Harmatta.
Also, the following exhibits, printed in Volume III of defendant's record:
Exhibit No. 34, Certified Copy of file wrapper and contents of Rietzel U. S. patent No. 928,701;
Exhibit No. 35, Certified Copy of file wrapper and contents of Interference No. 31,792, Rietzel v. Harmatta;
Exhibit No. 36, Certified Copy of assignment of Harmatta application from Harmatta to Thomson Electric Welding Company;
Exhibit No. 37, Certified Copy of assignment of Rietzel application from Rietzel to Thomson Electric Welding Company, of Maine;
Exhibit No. 38, Certified Copy of assignment of Thomson Electric Welding Co. of Maine of all its assets, to Thomson Electric Welding Co. of Mass.;
Exhibit No. 39, Certified Copy of assignment of Rietzel patent from Thomson Electric Welding Co. of Maine to

Thomson Electric Welding Co. of Mass.;

Exhibit No. 40, Certified Copy of assignment of Harmatta patent and Rietzel patent from Thomson Electric Welding Co. to Thompson Spot Welder Co.

Exhibit No. 41, Certified Copy of assignment of de Ferranti application from de Ferranti to F. L. Middleton;

Exhibit No. 42, Certified Copy of assignment of de Ferranti application from F. L. Middleton to Melville Church;

Exhibit No. 43, Certified Copy of assignment of de Ferranti application from Melville Church to H. C. Milligan, trustee;

Exhibit No. 44, Original license from H. C. Milligan, trustee, to Ford Motor Co., under de Ferranti application;

Exhibit No. 45, Certified Copy of decree on mandate in Thomson Electric Welding Co., et al., vs. Barney & Berry, Inc., under Harmatta patent;

Exhibit No. 46, Certified Copy of record in Thomson Electric Welding Co., et al., vs. National Enameling & Stamping Co.;

Exhibit No. 47, Certified Copy of docket entries in Thomson Electric Welding Co. et al., vs. U. S. Metal Products Co.;

Exhibit No. 48, Copy of pleadings in Thomson Electric Welding Co. v. U. S. Metal Products Co.;

Exhibit No. 49, Dyer Photographs A-1 to A-6 (not reproduced);

Exhibit No. 50, Dyer Photographs B-1 to B-14 (not reproduced);

Exhibit No. 51, Dyer Photographs C-1 to C-8 (not reproduced);

Defendant's Exhibit Agreement of August 3, 1912, between Thomson Elec. Weld Co. and American Elec. Weld Co.;

Defendant's Exhibit Agreement of June 10, 1914, between Thomson Elec. Weld Co. and American Elec. Weld Co.;

Defendant's Exhibit, Tilghman Correspondence;

Defendant's Exhibit, Rietzel Sketch.

To which are to be added: As Exhibit No. 52, Certified Copy of Harmatta Canadian application of December 1st, 1903, No. 108,990;

As Exhibit No. 53, Copy of Rietzel patent No. 1,041,351, dated October 15, 1912.

(Mr. Stackpole: I forgot to mention, your Honor, we have already filed and ask to be accepted by the Court interrogatories of the defendant and the answers to certain stipulations which are contained in each deposition. I cannot remember all of them.)

(The Court: They are in.)

(Mr. Stackpole: With Mr. Church's consent, I will ask your Honor to make an order that the exhibits that are now in this case remain in the custody of the Clerk from now on, and shall not be withdrawn without the consent of the Court or consent of counsel on both sides.)

(The Court: Any objection to that?)

(Mr. Church: No objection.)

(The Court: Very well; I will give that order.)

F. P. McBERTY.

F. P. McBERTY, recalled for further cross-examination, testified as follows:

Examined by MR. STACKPOLE:

X-Q. 847. You have referred many times to the National Electric Welder Company; is that a company or partnership?
A. That is a company, a corporation.
X-Q. 848. Where are the factories or stores of that company?
A. It was in Warren, Ohio.
X-Q. 849. What was the company capitalized for?
A. $25,000, I think, originally, and later, increased to $75,000.
X-Q. 850. By "later" you mean what year?
A. I don't believe I can recollect the date; I would not want to make a definite statement whether that is the actual condition or not. It was capitalized at $75,000 when I discontinued my connection with it.
X-Q. 851. How much of the stock did you hold?
A. I held 25%.
X-Q. 852. How much did Mr. Wolcott hold?
A. He and his wife held 50%.
X-Q. 853. And you and your wife owned what per cent?
A. The other half.
X-Q. 854. So you and your wife owned half of the company?
A. Yes, sir.
X-Q. 855. Did the company ever pay any dividends?
A. No, I don't think it ever did.
X-Q. 856. What was your office in that company?
A. I was nominally known as secretary and treasurer.
X-Q. 857. General manager also?
A. Yes, sir.
X-Q. 858. You practically had charge of the entire operations, did you?
A. I had charge of the manufacturing end of it, not the selling.

X-Q. 859. And the financial end?
A. I didn't devote my attention to the financial end of it.
X-Q. 860. But you and your wife had a half interest in the company?
A. Yes, sir.
X-Q. 861. It was really a partnership between you and Mr. Wolcott, half and half?
A. Well, it would be.
X-Q. 862. Under corporate form?
A. Under corporate form, yes, sir.
X-Q. 863. How big is the building of the National Electric Welder Company?
A. The building was 80 x 200 feet.
X-Q. 864. And of what material?
A. Steel, glass, brick and wood.
X-Q. 865. What was it taxed for in 1917?
A. That is a matter I could not state myself at all.
X-Q. 866. You were treasurer at that time?
A. Yes, I was treasurer. Mrs. McBerty took care of all those affairs.
X-Q. 867. Did you pay the tax bill?
A. Mrs. McBerty attended to that.
X-Q. 868. Can't you remember whether it was taxed for over $25,000 at that time?
A. No, I could not really make a definite statement. I had nothing to do with the payment of the taxes.
X-Q. 869. What was your salary as treasurer, secretary, and general manager of the National Compnay?

(The Court: The National Company?)

(Mr. Stackpole: Yes, your Honor.)

(The Witness: It was, I think, $150 a month.)

X-Q. 870. That would be $1,800 a year?
A. Yes, sir.
X-Q. 871. Was that your salary in 1917?
A. Now, that is a question I would not want to answer definitely, without referring to our books.
X-Q. 872. Was it materially increased?
A. I don't remember, as it was materially increased.
X-Q. 873. That was about it?
A. Somewhere in that neighborhood.
X-Q. 874. To whom did the National Company sell its plant?
A. Sold its plant to what is known as the Federal Machine Welding Company.
X-Q. 875. Are you employed by that company now?
A. Yes, sir.

X-Q. 876. What salary are you getting?
A. I get $750 a month.
X-Q. 877. When was that sale made?
A. In September, 1917, I think.
X-Q. 878. And the Federal Company bought the property of the National Company?
A. The physical assets of the National Electric Welder Company.
X-Q. 879. And you are now in what position in the Federal Company?
A. As general manager.
X-Q. 880. Any other member of your family employed by the Federal Company?
A. Mrs. McBerty.
X-Q. 881. Mrs. McBerty. How much does she get?
A. She gets $350 a month.
X-Q. 882. What is her position?
A. Secretary and treasurer.
X-Q. 883. Does the Federal Company manufacture welding machines?
A. Yes, sir.
X-Q. 884. And sells them?
A. Yes, sir.
X-Q. 885. Put them out on lease?
A. No, sir.
X-Q. 886. Sells them?
A. Sells them outright.
X-Q. 887. How large a business did the Federal Company do in 1918 in spot welding machines?

(Objected to.)

(The Court: I don't know how this is material.)

(Mr. Stackpole: It shows his interest.)

(Mr. Church: There is a suit pending in Cleveland between the Thomson Electric Welding Company and the National Company, and I think this is for the purpose of using this information in that suit.)

(Mr. Stackpole: Not at all, your Honor.)

(The Court: It is not on the line of the direct examination at all.)

(Mr. Church: I object as not proper cross-examination.)

(The Court: Until I know more about it, I will sustain the objection.)

(Mr. Stackpole: It bears on the interest of the witness in the testimony he has given and the result of this case——)

(The Court: In what way?)

(Mr. Stackpole: Being employed by the Federal Company, he is interested in the result, whether or not the Harmatta patent is sustained as part of the business of the Federal Company, and for the whole business of the Federal Company in manufacturing——)

(The Court: Is the subject matter of the suit in Cleveland the subject matter of this suit?)

(Mr. Stackpole: No, your Honor, is is not.)

(Mr. Church: It is a suit for damages against Mr. McBerty and others.)

(The Court: So far as interest is concerned, it seems to me you have gone as far as the Court ought to permit you to go, showing there is some adverse interest between the witness and the plaintiff, but the exact details of it you certainly ought not to spend time on.)

(Mr. Stackpole: Very well, your Honor. I just wanted to bring out the main facts; that is all.)

X-Q. 888. In the experiments made yesterday at the plant of the Ford Company, how rapidly were the spot welds made? That is to say, how long was the current on in making the spot welds?

A. I would roughly estimate that as one and one-half seconds or two seconds.

X-Q. 889. And in your attempts to butt weld, how long was the current on?

A. I should say that was less than a second.

X-Q. Very quick?

A. Yes, sir.

X-Q. 891. And in welding the blades to the spiders, you were demonstrating the exact reproduction of what you say you did in 1901?

A. As nearly as I could.

X-Q. 892. And spider blades the same thing?

A. Practically the same, yes, sir.

X-Q. 893. And the machine was in the same condition as it was from the beginning, as far as the transformer is concerned?

A. Yes, sir, I should say it was.

X-Q. 894. Now, in the factory of the Warren Electric and Specialty Company, after the blades had been riveted to the spiders in

the manufacture of these fans, what was the next step in the process of completing the fans?

A. The blade would be mounted on the hub.

X-Q. 895. Would it be pinned to another arm for that purpose?

A. Yes, it would. Ordinarily, it would.

X-Q. 896. And the fans would be taken in lots, I suppose, to the other room?

A. In tray fulls, yes, sir.

X-Q. 897. And the operator would then put the fan on the hub?

A. Yes, sir.

X-Q. 898. When did the japanning occur?

A. The japanning occurred after the blades had been given the proper pitch and the proper balance.

X-Q. 899. How many coats of japan?

A. I would not make a definite statement, but my impression is two coats of japan, depending upon the type of finish they were given.

X-Q. 900. How long would it take to do the drying?

A. Over night.

X-Q. 901. One day?

A. Yes, sir.

X-Q. 902. How long did it take to assemble the parts in such complete fan?

A. My recollection is a trifle hazy, but I would say one man would assemble 10 or 15 fans a day.

X-Q. 903. And your output that year was 3,000?

A. No, I don't think the entire output—well, it was in excess of 3,000.

X-Q. 904. You don't agree with Captain Smith, who has already testified?

A. I don't know what he testified.

X-Q. 905. Assuming he testified the output was 3,000, you would not agree with him?

A. I don't think I would.

X-Q. 906. How many of this type of fans were made?

A. I would not want to make a definite statement on that.

X-Q. 907. As many as a thousand?

A. I would not say. I don't believe there were.

X-Q. 908. As many as 500?

A. Somewhere in that neighborhood.

(The Court: Were they in two sizes?)

A. Two sizes.

X-Q. 909. Would you say about a thousand, so that we can talk in definite figures?

A. I would say a thousand of both types, all sizes of the types.

X-Q. 910. And that would make 2,000 rings to be welded?

A. Three rings on each.

X-Q. 911. Were there three rings on each fan?

A. Two rings in front, two large ones and one small one.

X-Q. 912. Then there were three rings, one small one and two large ones? That would make three thousand welds?

A. Yes, sir, with that amount of production.

X-Q. 913. And those butt welds would take how long?

A. Each butt weld?

X-Q. 914. No. How long would it take to make the whole 3,000?

A. If a man did nothing but weld those rings, he could readily produce them in two weeks.

X-Q. 915. And if he did nothing but spot weld, as you spot welded this morning, how long would it take him to put the spindles on the blades of those fans?

A. Well, a thousand fans would keep him quite busy at it for a month or six weeks.

X-Q. 916. Do you remember what month of the year 1917 you first saw this 1901 catalog?

A. I have a poor memory for dates; my impression is it was along in the spring of 1917.

X-Q. 917. After the first of April?

A. Well, I would not want to confine myself to days, but it was somewhere about March or April. My method of getting them in my memory is the condition of the weather when I went to the Peerless plant—on that date.

X-Q. 918. Look at page 13 of the 1901 catalog. Come down where you can get a good light, Mr. McBerty. Do you see rivet heads on the blade that sticks up toward the left hand?

A. No, sir; my eyes are none too good.

X-Q. 919. In the upper corner of No. A-5?

A. No, I would not say that I did. No.

X-Q. 920. And in the cut of the A-6 fan, do you see any rivet heads on the blade standing up in the same direction, toward the left hand corner?

A. No, I don't.

X-Q. 921. And in the E-2 fan on page 15, do you see the third rivet head in the blade extending to the right?

A. No, I can not distinguish that one either.

X-Q. 922. And in the E-3 fan on page 16, do you see any rivet heads on the blade extending to the right?

A. No, I can not see any rivets there myself. I can not distinguish any.

X-Q. 923. And in the same cut, how many rivets can you see on the blade that sticks up straight?

A. I can not distinguish any rivets on the blade that runs straight up.

X-Q. 924. The one down there?

A. Yes, sir, when you call my attention to it, I would say there is a rivet down at the bottom of the blade, but that is the only one I can distinguish.

X-Q. 925. After you had received this catalog of 1901, did you show it to Captain Smith?

A. I don't recollect of ever showing that catalog to Mr. Smith at all, personally.

X-Q. 926. Did you show other catalogs to him?

A. I don't recollect that either. I may have.

X-Q. 927. Are there any of these 1901 catalogues in existance, except this one?

A. I was under the impression there were two or three more like it at that time, or one more.

X-Q. 928. Of your own knowledge, do you know that you have ever seen any more?

A. I think we had another one just like that at the factory.

(Mr. Stackpole: If you have any, will you furnish copies, Mr. Church?)

(Mr. Church: I think that is all we have.)

X-Q. 929. And of the 1902 catalog, have you other copies, or no other copies?

A. I don't know.

(Mr. Stackpole: How about that, Mr. Church?)

(Mr. Church: That is the only one I know of.)

X-Q. 930. Where did the 1901 catalog come from, to your own knowledge?

A. That catalog, I think, was taken from—

X-Q. 931. No. Where did it come from, so far as you are concerned?

A. May I look at it, please?

X-Q. 932. Certainly.

A. (Examining catalog. This is the catalog that was turned over to me personally, I believe, by W. C. Wier of the Peerless Electric Company. It has no identification mark, but it is the catalog that he gave to me.

X-Q. 933. Was it in this dilapidated condition when it was given to you?

A. No, it was in good condition when given to me.

X-Q. 934. It looks as if it had been handled a good deal, does it not?

A. Yes, it does.

X-Q. 935. And it was given to you there?

A. At the office of the Peerless Electric Company at Warren.

X-Q. 936. Warren, Ohio?

A. Yes, sir.

X-Q. 937. In 1917?

A. Yes, sir.

X-Q. 938. In the spring?

A. That is my impression, in the spring, yes, sir.

X-Q. 939. And you showed it to Mr. Pattison?

A. Yes, sir.

X-Q. 940. And Mr. Church?

A. I don't remember of showing it to Mr. Church myself.

X-Q. 941. To whom did you show it besides these gentlemen?

A. That is difficult to say. My impression is I turned it over to Mr. Pattison. I don't recollect personally when I called it to anybody's attention after that.

X-Q. 942. Mr. Pattison took it and had charge of it after that?

A. Mr. Pattison, I think, had entire charge of it.

X-Q. 943. Yesterday in operating the machine at the Ford factory, you used a little jig to position the blade on the arm of the spider?

A. Yes, sir.

X-Q. 944. When did you make that jig?

A. I had one of our men make that jig last week.

X-Q. 945. Did you use one like it in 1901?

A. Yes, I believe I did.

X-Q. 946. Are you sure of that?

A. Yes, sir.

X-Q. 947. Absolutely sure?

A. That is the reason I made this particular type of equipment.

X-Q. 948. To take care of the position of the unpunched blade, is that it?

A. That is the only method of locating the blade readily.

X-Q. 949. Did you make the jig yourself in 1901?

A. I would not say whether I did or not.

X-Q. 950. If you did not, do you know who did?

A. No, I don't.

X-Q. 951. Now, coming down to the time when Mr. Howe visited you in 1913, did you show him the machine in the frame as it is now?

A. No, that frame was built in 1917.

X-Q. 952. What time of the year 1917?

A. The spring of the year 1917.

X-Q. 953. For the purpose of connecting the transformer with the welding device?

A. Yes, sir, to illustrate about how it was to be used.

X-Q. 954. And that was done at the factory of the National Company?

A. That was done at the factory of the National Electric Welder Company.

X-Q. 955. Did you ever try welding with any other taps than the ones you used yesterday, the 4½ 0 taps?

A. My impression is that I did, due to the fact we did not have the same voltage called for by the other machine.

X-Q. 956. What was your voltage in the National Company's plant?

A. 220 volts.

X-Q. 957. Did you ever use another transformer with this device?

A. At the National plant?

X-Q. 958. Yes.

A. I don't believe I did.

X-Q. 959. Now, when Mr. Howe called upon you, you explained to him the situation in 1901, I believe, about this machine?

A. Yes, sir.

X-Q. 960. Did you give him any reason why the spot welding of blades to the spiders was not done commercially?

A. My impression is rather hazy on that matter, but the statement as given to Mr. Howe was along the line we were going to duplicate our line of stock and it would add to the cost and was not considered advisable.

X-Q. 961. Did you tell Mr. Howe one of the reasons was that the blades were already punched?

A. I don't definitely recollect that.

X-Q. 962. Did you tell him that the reason the blades were all punched was because there would be no saving in the use of spot welding over rivets? Did you tell him that?

A. I don't definitely recollect that either.

X-Q. 963. Did you also tell him another reason was because that work was in February, 1901, and that was late in the fan season?

A. I might have done that. That would be late in the season.

X-Q. 964. That would be late in the fan season?

A. That would be late in the fan season to start.

X-Q. 965. Did you tell him the reason the rivets were already made and they could see no reason to change?

A. I don't recollect that statement.

X-Q. 966. Did you tell him the rivets had made a good job, and therefore, no reason to change?

A. I don't recollect that statement either, but that would be self-evident.

X-Q. 967. When Mr. Howe came to visit you in 1913, did you introduce him to the other men whom you thought might know about your welding in 1901?

A. I introduced him to some, I know.

X-Q. 968. Did you introduce him to E. C. Lipps?

A. Yes, sir.

X-Q. 969. Did you talk with Mr. Lipps in Mr. Howe's presence?

A. Yes, sir.

X-Q. 970. And discuss what you did in 1901 with him, with Mr. Lipps and Mr. Howe?

A. Yes, sir.

X-Q. 971. And Mr. Lipps told what he remembered to Mr. Howe and to you?

A. Yes, sir.

X-Q. 972. Do you remember Mr. Lipps signing an affidavit?

A. My impression is he did.

X-Q. 973. And the substance of the affidavit was what Mr. Lipps told you and Mr. Howe?

A. Yes, sir, it would be.

X-Q. 974. And the affidavit was prepared by Mr. Howe?

A. Yes, sir.

X-Q. 975. Do you recall reading the affidavit at that time?

A. I believe I did.

X-Q. 976. And agreed with its substance?

A. Yes, sir.

X-Q. 977. Did any of your family assist in preparing these affidavits, in the way of typewriting and so on?

A. I would not want to make a definite statement on that, for the reason these affidavits were prepared in Detroit.

X-Q. 978. In Detroit?

A. Yes, sir.

X-Q. 979. That is, Mr. Lipps' affidavit?

A. Yes, sir.

X-Q. 980. Do you remember of introducing Mr. Howe to a man named Milton W. Bechtel?

A. I don't remember such a name. What was his first name?

X-Q. 981. Milton W. Bechtel.

A. No, that name is not familiar to me at all.

X-Q. 982. Did you introduce Mr. Howe or see him with a man named Austin C. Pendleton?

A. Not that I can remember.

X-Q. 983. Not to your recollection?

A. Not to my recollection.

X-Q. 984. To Oscar C. Tilz?

A. No.

X-Q. 985. Robert J. Manley?

A. No.

X-Q. 986. Was not Robert J. Manley employed by the Warren Company in 1901?

A. Isn't that Mannely?

X-Q. 987. My pronunciation of it is probably at fault.

A. No, I don't recall knowing him at all personally. I don't recollect of seeing him in connection with Mr. Howe at all.

X-Q. 988. Was Mr. Mannely employed there at the plant?

A. I don't recollect that either.

X-Q. 989. Either in 1901 or 1902, while you were there?

A. I don't recollect that. I had nothing to do with the employing of the help at the plant.

X-Q. 990. You were superintendent?

A. I was superintendent.

X-Q. 991. How many men were employed there in the National Company's plant, the Warren Company's plant?

A. It depends upon the time of the year, but I would say on an average of 40 or 50 or 60.

X-Q. 992. And you had general charge of it?

A. Yes, sir.

X-Q. 993. Do you know John W. Gilder?

A. Yes, sir.

X-Q. 994. He was employed there, was he not?

A. Yes, sir.

X-Q. 995. And you took Mr. Howe to see him?

A. I don't remember—I don't know whether I took Mr. Howe to see him, but think I had Mr. Gilder come to see Mr. Howe.

X-Q. 996. And he talked with you and Mr. Howe?

A. Yes, sir.

X-Q. 997. Told what he remembered?

A. Yes, sir.

X-Q. 998. In your presence?

A. Yes, sir.

X-Q. 999. And Mr. Howe prepared his affidavit?

A. Yes, sir.

X-Q. 1000. And Mr. Gilder swore to it?

A. Yes, sir.

X-Q. 1001. And you agreed to its contents?

A. Yes, sir.

X-Q. 1002. You know Walter T. Wakefield?

A. Yes, sir.

X-Q. 1003. What was his position in the company in 1901?

A. I believe Walker T. Wakefield had charge of the fan motor parts.

X-Q. 1004. Do you remember of introducing Mr. Howe to Mr. Wakefield and talking together?

A. No, that does not stick in my recollection.

X-Q. 1005. Did you give Mr. Howe Mr. Wakefield's name as a person who might know these circumstances of 1901?

A. I think I did.

X-Q. 1006. And so far as you know, Mr. Howe went to see Mr. Wakefield?

A. I think so, yes, sir.

X-Q. 1007. Mr. Howe told you so?

A. I don't remember.

X-Q. 1008. Did Mr. Wakefield tell you so?

A. I think Mr. Wakefield told me so.

X-Q. 1009. Mr. Wakefield told you he had given an affidavit to Mr. Howe?

A. I don't believe he did.

X-Q. 1010. He told you he had a talk with Mr. Howe?

A. Yes, sir.

X-Q. 1011. Did he tell you what he told Mr. Howe?

A. I don't think he did.

X-Q. 1012. Were you not enough interested to try to find out?

A. I might have been, but my recollection does not bring that back to me.

X-Q. 1013. Do you know David S. Estabrook?

A. Yes, sir.

X-Q. 1014. Was he employed in the Warren Company's plant?

A. Yes, sir.

X-Q. 1015. In what capacity?

A. I believe, if you mean David S. Estabrook, he was employed in a portion of the fan motor department.

X-Q. 1016. Did you introduce Mr. Howe to David S. Estabrook?

A. I believe I did.

X-Q. 1017. And talked together about these circumstances in 1901?

A. I think so.

X-Q. 1018. Was the substance of Mr. Estabrook's statement put in the affidavit by Mr. Howe?

A. That I would not want to say offhand.

X-Q. 1019. Mr. Howe was there to get affidavits from Mr. Estabrook?

A. Yes, sir, it is presumed he did.

X-Q. 1020. And you agreed with what Mr. Estabrook told Mr. Howe?

A. I did.

X-Q. 1021. He didn't tell him anything new, anything you did not know before?

A. He may have, I would not say that, for if I had known it, I would not have taken him to Mr. Estabrook.

X-Q. 1022. Did you know Robert W. Bean?

A. Yes, sir.

X-Q. 1023. Where was he employed in the year 1901?

A. He was in the machine shop department.

X-Q. 1024. Did you introduce Mr. Howe to him?

A. I believe so.

X-Q. 1025. And talked this matter over with Mr. Howe in his presence?

A. Yes, sir.

X-Q. 1026. Do you remember whether he gave Mr. Howe an affidavit or not?

A. I believe he did.

X-Q. 1027. Did you see the affidavit?

A. I don't recollect that.

X-Q. 1028. But you agreed with what Mr. Bean told Mr. Howe?

A. Yes, sir.

X-Q. 1029. And he gave an accurate statement of the facts at that time?

A. Yes, sir.

X-Q. 1030. Did you know Mr. Alton J. Lewis?

A. I guess that is a man we know as Ally Lewis. Yes, I remember him.

X-Q. 1031. Was he employed by the Warren Company in 1901?
A. Yes, sir.
X-Q. 1032. In what capacity?
A. I believe he was a buffer; I could not say definitely.
X-Q. 1033. Did you introduce Mr. Howe to him?
A. I believe so.
X-Q. 1034. And talked the matter over with him as to the 1901 work?
A. Most likely I did.
X-Q. 1035. Do you remember that he took his affidavit?
A. I have no recollection of that.
X-Q. 1036. But you agreed with Mr. Lewis, with what he said to Mr. Howe?
A. Yes, sir.
X-Q. 1037. You know Mr. Edward Baedeker?
A. Yes, sir.
X-Q. 1038. Where was he employed in 1901?
A. He was punch press man.
X-Q. 1039. For the Warren Company?
A. Yes, sir, for the Warren Company.
X-Q. 1040. Did you introduce Mr. Howe to him?
A. That does not stick in my recollection.
X-Q. 1041. You cannot say you didn't?
A. No.
X-Q. 1042. Did you ever see Mr. Howe and Mr. Baedeker together?
A. I don't recollect that.
X-Q. 1043. Did you give Mr. Howe Mr. Baedeker's name?
A. I think I did, yes, sir.
X-Q. 1044. And you understood he was going to see Mr. Baedeker and get an affidavit from him?
A. I understood he was going to see all the old employees.
X-Q. 1045. And you helped him reach all the employees?
A. I supplied him with the names of what I could.
X-Q. 1046. You gave him the names of all that you thought had any knowledge of the welding operations in 1901?
A. Yes, sir.
X-Q. 1047. You didn't exclude anybody?
A. No, I don't believe I did.
X-Q. 1048. You remember Newton W. Wolcott?
A. Yes, sir.
X-Q. 1049. Where was he employed in 1901?
A. At the Warren Electric Company. I will take that back. I was thinking of him as he now is. I don't believe I know where Mr. Wolcott was. He was, I believe, in Warren at that time.
X-Q. 1050. A young fellow?
A. Yes, sir, reasonably so, or was at that time.
X-Q. 1051. You gave Mr. Howe Mr. Wolcott's name?
A. I don't recollect that.

X-Q. 1052. He was not one of the employees?

A. Not a steady employee. Mr. Wolcott worked either with the Warren or the Peerless, I think, one or two summer vacations.

X-Q. 1053. You may have given his name to Mr. Howe as somebody who worked around the plant in the summer?

A. Yes, sir.

X-Q. 1054. Do you remember Alfred Ulp?

A. Yes, sir.

X-Q. 1055. Where was he employed in 1901?

A. There.

X-Q. 1056. Whereabouts?

A. He was in the machine shop.

X-Q. 1057. You and Mr. Ulp talked the matter over about the circumstances of 1901?

A. I think we did.

X-Q. 1058. And you agreed with what Mr. Ulp said?

A. Yes, sir.

X-Q. 1059. Mr. Ulp gave an affidavit?

A. I would not want to make a definite statement regarding that.

X-Q. 1060. The conversation was for that purpose, was it not?

A. That was the idea.

X-Q. 1061. In fact, it was intended to take affidavits of all these men familiar with that situation in 1901, and which could be presented by Mr. Howe to his firm?

A. Yes, sir.

X-Q. 1062. The idea of getting the exact recollection of what happened at that time from as many men as you could get hold of? That was the idea?

A. Yes, sir, that was the idea.

X-Q. 1063. You know Mr. Charles B. McCurdy?

A. Yes, sir.

X-Q. 1064. Mr. Howe got an affidavit from him, did he not?

A. I don't recollect of seeing Mr. McCurdy's affidavit, but my impression is he did make an affidavit which would have something to do with the transformer, at least.

X-Q. 1065. You and Mr. Howe and Mr. McCurdy talked it over together?

A. Yes, sir.

X-Q. 1066. And you agreed with what Mr. McCurdy said?

A. Yes, sir.

X-Q. 1067. Do you know Rowland Pfile?

A. Yes, I know him.

X-Q. 1068. Where was he employed in 1901?

A. I don't believe I know where Rowland Pfile was employed in 1901.

X-Q. 1069. Did you talk this matter over with Mr. Howe and Mr. Pfile?

A. I don't recollect that part of it.

X-Q. 1070. You think you gave Mr. Howe Mr. Pfile's name?
A. I think possibly I did. Mr. Pfile was employed, I believe, at the Colonial Electric Company at that time.
X-Q. 1071. By "at that time" you mean 1901?
A. Yes, sir.
X-Q. 1072. Do you recall Frank G. Brown?
A. Yes, sir.
X-Q. 1073. Where was he employed in 1901?
A. I believe he was the Packard Motor Car man at Warren.
X-Q. 1074. Did he ever enter your employment, or the employment of the Warren Electric & Specialty Company, about that time?
A. I believe he did.
X-Q. 1075. What time of the year; do you remember?
A. No, I don't recollect that now.
X-Q. 1076. Did Mr. Brown and Mr. Howe talk the history of this welding operation over together?
A. We did.
X-Q. 1077. Do you recollect that Mr. Brown made an affidavit?
A. I think he did.
X-Q. 1078. And you agreed with Mr. Brown, as to what he said in his affidavit?
A. Yes, sir.
X-Q. 1079. Did you read the affidavit?
A. I must have.
X-Q. 1080. Why do you say you must have?
A. Why, if I agreed with it, I did.
X-Q. 1081. At any rate, you agreed with what Mr. Brown told Mr. Howe?
A. Yes, sir.
X-Q. 1082. Did you introduce Mr. Howe to Mr. McDonnell?
A. To John McDonnell?
X-Q. 1083. Yes.
A. I think I did.
X-Q. 1084. Where was Mr. McDonnell employed in the year 1901?
A. He was with the Warren Electric and Specialty Company.
X-Q. 1085. In what capacity?
A. His position at that time was chief inspector and tester.
X-Q. 1086. Testing what?
A. Desk fans.
X-Q. 1087. Did you go with Mr. Howe to see Mr. McDonald?
A. Yes, sir.
X-Q. 1088. Where was he living at that time?
A. Living in the country. It is rather difficult to identify the particular place, but up towards Ellson's Ledge.
X-Q. 1089. A half dozen miles out of Warren?
A. Yes, sir.
X-Q. 1090. Did you talk the situation over with Mr. McDon-

ald and Mr. Howe, about what was done with this welder in 1901?

A. Yes, sir.

X-Q. 1091. And you agreed with what Mr. Howe said?

A. My impression is I did.

X-Q. 1092. What is the first name of Captain Smith?

A. William Smith.

X-Q. 1093. Did you tell Mr. Howe of Mr. William Smith, and introduce him to William Smith at the time of his visit?

A. No, I don't recollect that.

X-Q. 1094. Where was Mr. Smith living at that time, in 1913?

A. I believe he lived in Youngstown. I could not say definitely.

X-Q. 1095. Did you see Mr. William Smith in 1913?

A. I don't recollect that. I may have seen him in 1913, but I don't recollect of seeing him in the presence of Mr. Howe.

X-Q. 1096. You don't know whether Mr. Smith gave an affidavit, do you?

A. No, I don't recall that.

X-Q. 1097. But you do recall giving Mr. Howe Mr. Smith's name?

A. Not definitely. My impression is I did. I named over all the employees I could remember, at the plant.

X-Q. 1098. You remembered Mr. Smith at that time?

A. I might have.

X-Q. 1099. And you might have overlooked it?

A. Yes, sir.

X-Q. 1100. As not knowing much about this welding?

A. My impression is that in 1901 Mr. Smith was a transformer man.

X-Q. 1101. Not knowing much about welding?

A. Whether he was connected with that particular branch or not, I could not say.

X-Q. 1102. You know Mr. Jasper Powers?

A. Yes, sir.

X-Q. 1103. Where was he living in 1913?

A. I believe he lived in Mansfield, Ohio, in 1913.

X-Q. 1104. Where was he employed in 1901?

A. At the plant of the Warren Electric & Specialty Company at Warren.

X-Q. 1105. In what department and what capacity?

A. He was really a machinist at that time, superintendent.

X-Q. 1106. Did you give Mr. Howe Mr. Powers' name?

A. Yes, sir.

X-Q. 1107. As one of the people that would know about this electric welder?

A. Yes, sir.

X-Q. 1108. Tell him where he could be found?

A. Yes, I believe I did.

X-Q. 1109. Did you talk with Mr. Powers and Mr. Howe together?

A. I don't recall of ever meeting Mr. Powers in company with Mr. Howe.

X-Q. 1110. But you told Mr. Howe everybody's name that you thought had any knowledge of this matter in 1901, did you not?

A. I endeavored to do that.

X-Q. 1111. You endeavored to give Mr. Howe all the information you had and could get on the subject?

A. I endeavored to assist him as much as possible.

X-Q. 1112. The only thing you held back was this Exhibit M?

A. Yes, sir.

X-Q. 1113. Did you give Mr. Howe any other specimens?

A. I believe I did.

X-Q. 1114. Do you remember what they were?

A. I don't recollect exactly what we had at that time. My impression is I gave him a small desk fan.

X-Q. 1115. Did you show Mr. Howe your tool box?

A. I believe I did.

X-Q. 1116. Did Mr. Howe look through the tool box?

A. I don't recollect as to that. I would not want to make a definite statement on that.

X-Q. 1117. Just showed him the outside?

A. I don't recollect.

X-Q. 1118. I suppose Mr. Howe was hunting for some definite article to be used as evidence or some documentary evidence, was he not?

A. He would be, yes, sir.

X-Q. 1119. And it would be a nice thing under the circumstances to fix dates

A. Yes, sir.

X-Q. 1120. Did you give Mr. Howe anything that was dated?

A. I don't recollect of giving Mr. Howe anything that was positively dated.

X-Q. 1121. What time in the year 1901 was it decided by the Warren Company to build this cheaper fan, or was it in 1901?

A. In 1900 they decided to produce that cheaper fan. It is difficult to say. This was a matter entirely in the hands of our general manager, E. W. Gillmer, and after he had looked over the previous year's business he would formulate a plan for the following year, and communicate the same to the factory, and he ordinarily would get that information somewhere along in October, November or December.

X-Q. 1122. Do you recollect telling Mr. Howe your decision to make this cheap fan was in the summer or fall of 1900?

A. No, I don't recollect that.

X-Q. 1123. Do you doubt you told him that?

A. No, I don't think so.

X-Q. 1124. You don't think you did?

A. No, I say I don't doubt but what I did.

X-Q. 1125. That being correct?

A. I would say that was correct.

X-Q. 1126. When did you begin making designs for this little welding device that formed part of your 1901 machine?

A. Let me see. I would say in the month of January.

X-Q. 1127. Did you make any drawings?

A. I believe that Mr. E. C. Lipps made a set.

X-Q. 1128. Well, I want to know what you did.

A. That is difficult for me to say. We had a sketch, but whether Lipps made it or I made it, it is rather difficult to say now, but my impression is Mr. Lipps made a sketch and I passed it through the machine shop.

X-Q. 1129. Why did you go to Mr. Lipps about the matter?

A. Mr. Lipps had a mechanical mind and had had a good deal of mechanical experience, and some spare time.

X-Q. 1130. Had he had any experience in electric welding?

A. I believe he had.

X-Q. 1131. And you had not had any?

A. I had not had any at all.

X-Q. 1132. And so you naturally went to Mr. Lipps to help you out?

A. He had the experience and the knowledge, yes, sir.

X-Q. 1133. Did you consult Mr. Craft about your design?

A. Yes, sir.

X-Q. 1134. That was after he went to Freehold?

A. Yes, sir.

X-Q. 1135. And after he had come back, of course?

A. After he had come back.

X-Q. 1136. Did you make any working drawings?

A. No, we didn't do that.

X-Q. 1137. In your talk with Mr. Howe, did you tell him of more than one four-bladed spider that was spot welded, complete?

A. I think I told him we made several.

X-Q. 1138. Whatever you told him was put down in the affidavit?

A. I expect so.

X-Q. 1139. You read the affidavit?

A. Yes, sir.

X-Q. 1140. Did you tell Mr. Howe of any assembled fans with these spot welded spiders and blades?

A. I don't definitely recollect that either.

X-Q. 1141. Did Mr. Howe ask you about that?

A. That I could not say.

X-Q. 1142. Don't you recall that it interested Mr. Howe to know whether these spot welded spiders and fans had gone into commercial use?

A. It would, yes, sir.

X-Q. 1143. But you don't recollect telling him?

A. No.

X-Q. 1144. That was a point you either held back or didn't know about?

A. I didn't know about definitely.

X-Q. 1145. Or didn't know about definitely?

A. Yes, sir.

X-Q. 1146. So you didn't tell him?

A. I would not say I did tell him.

X-Q. 1147. Whatever you told him was the truth, so far as you knew it at that time?

A. So far as I knew it at that time.

X-Q. 1148. Did you tell Mr. Howe that you had ever explained your spot welding on this machine to Mr. Frank G. Brown?

A. Yes, sir.

X-Q. 1149. Did you ever tell him you had explained it to Mr. Estabrook?

A. You mean by explaining it—

X-Q. 1150. That you told him of the spot welding operation.

A. I told him, I think, I had done spot welding on a machine.

X-Q. 1151. You told Mr. Howe you had told Mr. Estabrook about it?

A. Yes, sir.

X-Q. 1152. Did you tell Mr. Howe you had told Mr. Bean about it?

A. That I would say I did do too.

X-Q. 1153. You did?

A. Yes, sir.

X-Q. 1154. Did you tell Mr. Howe you had told Mr. Gilder about it?

A. I don't recollect having told Mr. Gilder about it, or whether I told Mr. Howe he had seen the work that was done.

X-Q. 1155. You told Mr. Howe Mr. Gilder had seen the work that was done?

A. That is my impression.

X-Q. 1156. And he put that in the affidavit?

A. I would not make a definite statement of that, I don't remember.

X-Q. 1157. Do you remember anything about what you told Mr. Howe as to the visit by Mr. Brown to your plant?

A. My impression is I told Mr. Howe Mr. Brown came to our plant, I believe one Sunday, and I told him something about what had been done.

X-Q. 1158. Did you tell Mr. Howe that Mr. Gilder had seen you doing the work of spot welding on this machine in 1901?

A. That I would not say.

X-Q. 1159. Did you tell Mr. Howe Mr. Bean had seen you doing the work of spot welding in 1901?

A. I believe I did.

X-Q. 1160. Did you tell Mr. Howe Mr. Lipps had seen you doing this work in 1901?

A. Yes, sir.

X-Q. 1161. Did you tell Mr. Howe that Mr. McDonald had seen you do any spot welding in 1901?

A. I believe not. I can not say.

X-Q. 1162. Did Mr. McDonald see you do spot welding in 1901?

A. I don't personally recollect that.

X-Q. 1163. Did you tell him Mr. Smith saw you actually spot weld in 1901?

A. I think he did.

X-Q. 1164. Did you tell Mr. Howe that?

A. I think I did.

X-Q. 1165. Did Mr. Powers see you actually do spot welding in 1901?

A. I believe Mr. Powers did.

X-Q. 1166. Did you tell Mr. Howe that?

A. I think so.

X-Q. 1167. Did you tell Mr. Howe of the straight electrodes for spot welding, pointed, as you call them, in 1901?

A. I don't recollect that.

X-Q. 1168. Did you tell him of the bent-up electrodes?

A. I think I did.

X-Q. 1169. Did anybody besides yourself do any spot welding on this machine in 1901?

A. Yes, sir, I believe, if my recollection serves me right, Mr. Smith did; I believe Mr. Powers did; there may have been others. It wasn't a secret. I hadn't close control of the machine, I paid no particular attention to it.

X-Q. 1170. Did you tell Mr. Howe you thought Mr. Smith and Mr. Powers had done spot welding on this machine in 1901?

A. I believe so; I can not be definite.

X-Q. 1171. You should have told him naturally at that time?

A. Yes, if I remembered definitely, I would.

X-Q. 1172. You spoke in your idea of welding the ends of two copper wires of using two sheets of iron or steel between them. Why did you use two sheets?

A. I was endeavoring to get practically the same resistance, which we get between the ends of the wire, to generate sufficient heat to bring the material up to a welding temperature.

X-Q. 1173. The January that you began the drawings for this welding device, that was of 1901, I assume?

A. Yes, sir, that would be the date.

X-Q. 1174. Do you remember of making the following statement in your affidavit:

> "In 1900 it was thought that a better business could be done if the company also manufactured a cheaper fan. Up to this time a considerable quantity of brass had been used in the manufacture of the fans, particularly the fan guard was made of brass rods and wire, and other parts were made of brass, and required considerable labor for buffing and finishing in addition to the cost of the brass itself. It was therefore proposed to make the fan guards, and other parts previously

made of brass, of iron and to japan the whole. This was in the summer and fall of 1900 in preparation for the fan season of 1901."

Do you recall making that statement?

A. I don't definitely recollect that, but that is a statement I made.

X-Q. 1175. You mean it is correct?

A. I would consider it correct.

X-Q. 1176. It is correct now?

A. Yes, sir.

X-Q. 1177. And it was correct in 1913?

A. Yes, sir.

X-Q. 1178. Do you recall making this statement:

"Upon his return from Freehold, N. J., Mr. Craft had ideas about electric welding machines, and as a result of conversations with Mr. Craft and my previous consultation with Mr. Lipps, I decided that electric welding would be the best means of securing the ends of the iron fan guards together. I accordingly in the summer or fall of 1900, made a sketch of a proposed welding machine."

Do you recall that statement?

A. No, I don't. I don't definitely recall that.

X-Q. 1179. Is that a correct statement?

A. I would say yes, inasmuch as it refers to the manufacturing to reduce the cost. I would not make a definite statement in regard to the date. I would say that was a little early.

X-Q. 1180. Do you recollect of making the following statement:

It occurred to me that the welding machine could also be used to cheapen these fans by employing it to secure the fan blades to the center arm by a number of spots which would take the place of the rivets which were previously employed. This was the only fan construction, or in fact any construction, which was employed by the company to which this character of weld was adaptable. In demonstrating the practicability of this idea, I took one of the steel fan blades and centers and welded the blades to the center arm, each blade being secured to the arm by a number of welds in different spots.

Do you recollect that statement?

A. No, that does not definitely stay in my memory, but that would be a statement I would make.

X-Q. 1181. Is that statement substantially correct?

A. Yes, sir.

X-Q. 1182. Correct now?

A. Yes, sir.

X-Q. 1183. Correct in 1913?

A. I would say yes, sir.

X-Q. 1184. Do you recollect the following statement:

> The question of adopting the spot welding in place of the riveting on the cheaper fans was seriously considered and would have been adopted except that the fan blades and centers, which we already had in stock, had been punched for the rivets and it made a somewhat botched job to leave the rivet holes open and secure the blades to the spiders by spot welding. Furthermore, inasmuch as the punching had already been done there was no saving in spot welding over the riveting. Furthermore, the tools and jigs for riveting were already made and a different set of jigs to perform the spot welding rapidly would have required a further expenditure. Moreover, this was in the month of February, which was well along in the fan season, so that it was impracticable to make a change over for that season so that it could only have been availed of for the next year. Furthermore, the riveted fans proved satisfactory and as they already had the tools and standard stock for building these fans, it was not thought advisable to provide a second set of apparatus and a duplicate set of unpunched stock for the spot welding of the cheaper fans.

Do you recall that statement?

A. I think I do.

X-Q. 1185. Correct now?

A. Yes, sir.

X-Q. 1186. Correct in 1913?

A. Yes, sir.

X-Q. 1187. An accurate description of the situation?

A. Very close to it.

X-Q. 1188. You have no exceptions to take to it?

A. No.

X-Q. 1189. Do you recall the following statement:

> "The machine remained in use as a butt welder by the Peerless Company after its organization, first at the works of the Warren Electric & Specialty Co., and it was later moved to the works of the Peerless Company when they were constructed in 1902, and was in use there up to three or four years ago. There was no work that we could use spot welding on advantageously, which accounts for the use of the machine for butt only in the regular commercial work."

Did you make that statement? And is it substantially correct?

A. That is a correct statement.

X-Q. 1190. Do you recall making it in connection with your affidavit?

A. No, I don't definitely recall it in connection with the affidavit.

X-Q. 1191. Do you recall the following statement:

> "I distinctly remember that at that time the space between the clamp arms 3 and 4 was not sufficiently deep to permit the sheets to be welded together to extend sufficiently low-down when placed between the electrodes 31 and 32, when these electrodes were straight, and so we bent the ends of these electrodes upwardly so as to allow the sheets of metal to enter between the electrodes to a sufficient extent to place the weld at the spot desired."

Do you recall making that statement?

A. I recall making that statement in connection with an affidavit, but I don't recall that particular affidavit.

X-Q. 1192. That statement is correct?

A. Yes, sir.

X-Q. 1193. And also was correct in 1913?

A. Yes, sir.

X-Q. 1194. Do you recall the following statement:

> "In the original machine the base plate was made in two pieces 1 and 2 which were separated by a piece of fibre, to insulate them, which extended substantially the whole length of the base plate."

A. Yes, sir.

X-Q. 1195. You remember that statement?

A. Yes, sir.

X-Q. 1196. That is correct?

A. That is correct.

(Mr. Church: Are you going to offer that in evidence?)

(Mr. Stackpole: After I have identified his signature.)

(Mr. Church: Are you going to let me see it, whether you offer it in evidence or not?)

(Mr. Stackpole: No.)

(Mr. Church: I think I have a right to see the whole affidavit.)

(Mr. Stackpole: When we offer it in evidence, the Judge will accept it or rule it out.)

X-Q. 1197. (By Mr. Stackpole.) How many affidavits, prepared by Mr. Howe, do you recall seeing and reading?

(Mr. Church: You mean his own affidavits?)

(Mr. Stackpole: No, those prepared by Mr. Howe.)

A. The only definite impression I have is three, I believe, one of Mr. Brown, one by E. C. Lipps, and mine.

X-Q. 1198. I show you what purports to be an affidavit by you with the caption "In the United States District Court, District of Massachusetts. Thomson Electric Welding Company et al. vs. Barney & Berry, Incorporated. In Equity On Harmatta Patent No. 1,046,066." And at the end of the affidavit appears the name of Fred P. McBerty. Do you recognize your signature?

A. Yes, I would acknowledge that signature.

X-Q. 1199. Is this the affidavit that you gave to Mr. Howe at the time of his visit to you in 1913?

(Mr. Church: Let him read it.)

(Mr. Stackpole: Certainly; I want him to identify it thoroughly (handing to the witness; the witness spends 15 minutes on examining the affidavit).)

(The Witness: Your Honor, may I see that exhibit?)

(The Court: This one?)

(The Witness: Yes, your Honor.)

(The Court: Any objection to his seeing this?)

(Mr. Stackpole: No, I have no objection to his seeing any exhibit in the case.)

(Question read.)

A. Yes, sir, I would say that was an affidavit given to Mr. Howe at that time.

X-Q. 1200. And sworn to by you before C. E. Stephens, notary public in and for Trumbull County, at Warren, Ohio, with the seal attached as appears on the affidavit?

A. Yes, sir.

(Mr. Stackpole: As part of the cross-examination, of this witness, we offer this affidavit in evidence as Plaintiff's Exhibit No. 28.)

X-Q. 1201. What exhibits are attached to this affidavit? Will you give a list of them? Take the affidavit and give a list of the exhibits.

A. Yes, I will give them. "K" is the discharge of F. P. McBerty from the United States Revenue Cutter Service. You don't care about the date, do you?

X-Q. 1202. No.

A. And what is apparently the original sketch from which the welding machine was built in 1901. That is marked Exhibit M. Another is a statement of the affairs of the Peerless Electric Company of July 31st, 1903. I do not see any identification mark there. Here is a bill of L. E. Skinner to Mr. McBerty, December 19, 1902. Here is a short piece of fan center or spider with a piece of material attached, approximately of the same grade of material as used in the fan blades. Also, a complete fan blade attached to a piece of spider with three spot welds. Also, a pencil sketch of the electric welding machine, marked Exhibit R. A second pencil sketch of the electric welding machine marked Exhibit S. Another, a book marked Exhibit L, which is the record book of the transformer iron tests. Also cost covering house built by F. P. McBerty.

X-Q. 1203. These exhibits appear to you to be authentic?

A. Yes, they do.

(Mr. Stackpole: I would very much like to have the Clerk mark that, before it gets away. Mark as filed, because I would like to have that exhibit kept in the custody of the Court. It is an important exhibit. I will ask one or two questions and then I will be through with this witness.)

X-Q. 1204. Referring now to the 1901 catalog of the Warren Electric & Specialty Company, were all the fan blades secured to the spiders by rivets in the cases of the fans shown in this catalog as A-5, A-6, E-2, E-3 and G-1?

A. A-5 and A-6, that is all the A type of fans, and all the E type of fans were riveted invariably, and the cut illustrates G-1 as having been riveted also.

X-Q. 1205. And each blade is secured to each spider arm with two, or in some cases, three rivets?

A. It would be so, yes, sir. It does not always show in the figure, depending upon the way the light strikes the fan blade. The light might so strike it as to cause a reflection, which would prevent its being seen.

(Mr. Stackpole: That is all the cross-examination.)

(*McBerty's testimony continued, page 399.*)

(Mr. Church: May I put another witness on directly after recess?)

(The Court: Certainly. I will endorse the order on that affidavit, if you want, or whatever you want.)

(Mr. Stackpole: I don't care for that. All I want is a general order that covers all the exhibits. All I want is that they may not be lost or in any way modified.)

(The Court: I will put it in charge of the marshal.)

(Mr. Stackpole: Oh, we have absolute confidence in Mr. Church. Exhibits do sometimes disappear in a most remarkable way.)

JASPER W. POWERS.

JASPER W. POWERS, after being duly sworn on behalf of the defendant, testified as follows:

Direct examination by MR. PATTISON:

Question 1. Mr. Powers, state your full name, please.
Answer. Jasper William Powers.
Q. 2. Where do you live?
A. 526 North Third Street, Barberton, Ohio.
Q. 3. What is your present occupation?
A. I am in charge of a machine shop at the Babcock & Wilcox Company, charge of tools and production at Barberton, Ohio.
Q. 4. Are you acquainted with Mr. Fred P. McBerty?
A. I am.
X-Q. 5. About how long have you known him?
A. Since the early part of 1898.
X-Q. 6. Where did you meet him?
A. At the works of the Warren Electric & Specialty Company at Warren.
Q. 7. What were your duties there?
A. I was engaged as a machinist and toolmaker.
Q. 8. How long did you occupy that position?
A. With the Warren Electric & Specialty Company, until some time during 1902, when it was taken over by the Peerless Electric Company. I was with the Peerless then in the same capacity until May of 1903.
Q. 9. While you were working at the Warren Electric & Specialty Company, did you see an electric welding machine there?
A. I did.
Q. 10. Do you know who designed or got up that machine?
A. The first knowledge I had of it, or of a machine of that kind, was suggested to me by Mr. McBerty.
Q. 11. How did he happen to suggest it to you?
A. As one of the tools, he wanted to build to perform certain operations on products that we were building.

(The Court: Were you his superior officer?)

A. I was not. I was directly under Mr. McBerty.
Q. 12. (By Mr. Pattison.) What do you know about this electric welding machine, the construction of it?

A. I had all to do with the building of it, and I know that primarily the machine was built as what he called a butt welder for welding ends of guard rings that we intended to use, or were going to use on a cheaper fan that we intended building.

Q. 13. When, if you know, was this cheaper fan developed?

A. I would say—we must have done it, or we must have been doing some work on it the latter part of 1900, although, as I recollect, there was no great amount of work being done on the fan itself until 1901; that is, the manufacturing months, the early months of 1901.

Q. 14. What was the difference between this cheaper fan and the fan that had been previously made by the company?

A. All parts of this fan were made of iron where we could use it, in place of brass, as on the fan we had built the two or three seasons previous.

Q. 15. What parts of this cheaper fan were made of iron?

A. The guards and blades, the hub, I don't recall anything else.

Q. 16. Did you do any welding on this machine?

A. I did.

Q. 17. Would you recognize that machine, do you think, if it were shown to you?

A. I would.

Q. 18. Will you please examine this machine over here and point out to the court the parts that you worked on? This is marked in this case for identification "Exhibit B, McBerty Machine."

A. The angle piece which makes up the base of the machine I made. I installed a piece of fibre insulation the full length of the machine, which is different than the one now in place. I made the levers, or similar levers, to what is now on the machine. I made at that time ridges and sliding blocks or similar blocks; and also machined up the castings, the terminals on the end of the cables, as I recall. It is many years since I have seen it. I recall similar castings to that.

Q. 19. What material did you make the sliding blocks of that machine?

A. We had to use such material as we could find around the shop for all the tools we made. I recall there was one pair of blocks made out of forged round copper bars.

Q. 20. To what shape did you forge that?

A. It was flattened down to a rectangular shape.

Q. 21. Did you do any welding at all on this machine?

A. I did.

Q. 22. About when did you first do any welding on it?

A. I can not give you the exact month, but I can fix the date very clearly for or about the spring of 1901.

Q. 23. Was this machine completed by you in 1901?

A. It was completed, yes, sir.

Q. 24. Have you any means by which you fix the date of the completion of this machine?

A. I have.

Q. 25. Please state.

A. My brother was with the Buffalo Exposition in 1901, and was doing magic work. We knew he was using at that time a set of rings that were welded together by a blacksmith to answer the purpose for his little act. As soon as we got the welding on this machine, I made him up a set of rings complete, filing them up, and had them nickel-plated, and sent them to him, and he used them at the Pan-American Exposition that summer.

Q. 26. What summer was that?

A. That was 1901.

Q. 27. Do you remember any incident during your brother's show that would bring back the welding to you?

A. Yes, sir. The fellows like to do all the talking they can while they are working, and I remember him saying, "Gentlemen, you will closely observe these rings are not made in a blacksmith shop; these are electric welded."

Q. 28. So you remember it on that account?

A. Yes, sir.

Q. 29. What time of the year was it you first went to the Exposition at Buffalo?

A. I didn't go to Buffalo before July.

Q. 30. How long before you went to Buffalo was it that you had completed this machine for Mr. McBerty?

A. As I remember, I sent him those rings in April or May. In April, I would say, and we had the machine in operation on the production before that time.

Q. 31. What kind of work in the production was this machine doing before that time?

A. The welding of the guard rings.

Q. 32. Do you know whether there was any other kind of welding done on that machine?

A. There was.

Q. 33. What kind was it?

A. What was then termed as spot welding.

Q. 34. Did you see any spot welding?

A. I did.

Q. 35. State what, if anything, you saw of the spot welding?

A. All of the spot welding that I can recall was experimental, or development work.

Q. 36. Of what character?

A. As development in trying out the machine on that class of work.

Q. 37. What class of work did you see this spot welding done on?

A. One of our samples, I recall, as having tried to take apart, and that was what we called our transformer iron. Afterwards, there were a number of samples around the shop.

Q. 38. What kind of samples?

A. Such as the fan blade stock that we were using, some with the spider welded to the fan blades.

Q. 39. Did you see any complete fan blades with the spiders?

A. I don't recall having seen any complete.

Q. 40. You said a moment ago you saw this sample tested. How did you see it tested?

A. By trying to separate the two pieces.

Q. 41. What was the result of this effort?

A. I have seen it on a piece of transformer iron. We pulled a piece of the metal out, instead of pulling the weld apart.

Q. 42. Did you examine that fan blade you say you saw spot welded to the spider?

A. Not any more than casually. The whole thing appealed to me; it was new. I don't recall how much examination I gave of those things, but I do know that we were spot welding, and that we did do different operations on there than butt welding.

Q. 43. Did you regard the spot welding as effective?

A. I would.

Q. 44. Did they seem to you to serve the purpose of rivets effectively?

A. They did.

Q. 45. Did you hear of any talk that would indicate the welds were or were not successful?

(Mr. Stackpole: That is objected to as hearsay.)

(The Court: Yes, I will sustain that objection.)

Q. 46. Then, as I understand you, you regarded the spot welds as being effective to serve the purpose of rivets?

A. I did.

Q. 47. In examining that machine, do you regard those parts which you pointed out there as the original parts you made?

A. I could not identify them as the original ones, except the lower members. I know that the insulation between the two is not the same.

Q. 48. You refer to the insulation extending through the space between the base—do you know whether that remained that way all the time?

A. No.

Q. 49. What was done about that?

A. That insulation was taken out and other insulation was put in place.

(The Court: During the time of the experiments?)

A. Along about that time; all I would say in the spring of 1901.

Q. 50. (By Mr. Pattison) Was that insulation as long as the first insulation that was put in there?

A. It was not.

Q. 51. Do you know why that insulation was shortened up?

A. Mr. McBerty had that done, and it wasn't until after that change was made that I knew why it was being done. The machine left my department as soon as it was completed, or as soon as I completed installing it in the fan motor department, as we termed it, which was separate from the machine shop.

Q. 52. Do you know why the spot welding was not adopted as a general manufacturing proposition for this cheap fan?

A. Not entirely, no.

Q. 53. Tell the Court what, if anything, you know about that.

A. Your Honor, I had built up and made a complete line of tools for riveting blades, for riveting spiders, and the men were trained for doing the work in that way; and while I was responsible for the production, for whatever fans we built, that is, the mechanical work on whatever fans were built, I rather argued in favor of continuing the riveting. The season was coming on, as I remember, and we had everything required to continue the manufacture of fans, or proceed with the manufacture of fans, by riveting.

Q. 54. You mean that you argued; with whom did you argue about that?

A. Our manager, Mr. Gillmer, and Mr. McBerty, who, as I remember, rather favored, did favor welding of the iron blades to the spiders.

Q. 55. Then at the time Mr. McBerty spot welded the blades to the spiders, you and Mr. Gillmer and Mr. McBerty discussed its regular manufacture by the company?

A. Yes, sir.

Q. 56. And you objected to it for the reasons you stated?

A. Yes, sir.

Q. 57. And they favored it?

A. Well, Mr. Gillmer did, and we proceeded to make them that way, by riveting.

Q. 58. How were the rivets headed up, at that time, by hand or machine?

A. They were what we call hand riveted.

(Mr. Pattison: That is all.)

Cross-examination by MR. STACKPOLE:

X-Q. 59. During the last three or four years, when was your attention directed again to the work that was done on this machine in 1901?

A. As I remember, it came up about—some time during 1913.

X-Q. 60. 1913?

A. Yes, sir.

X-Q. 61. Did you talk with Mr. McBerty about it in 1913?

A. Yes, sir.

X-Q. 62. Did you talk with him more recently about it than that?

A. Yes, sir.

X-Q. 63. In 1917?

A. Yes, sir.

X-Q. 64. And Mr. McBerty showed you photographs of that machine then?

A. No.

X-Q. 65. Showed you any samples then of spot welding?

A. Not that I recall.

X-Q. 66. Do you recall any samples of spot welding shown you in the year 1913?

A. Yes, sir.

X-Q. 67. By whom?

A. By Mr. McBerty.

X-Q. 68. You remember of seeing Mr. Howe in 1913?

A. I don't recall Mr. Howe.

X-Q. 69. That is all.

Redirect Examination by MR. PATTISON:

Re-D. Q. 70. Mr. Powers, have you ever seen any spot welding, or have you seen any spot welding machine except this?

A. That is the only spot welding machine I have ever seen.

Re-D. Q. 71. From 1901 up to the present time?

A. At any time.

Re-D. Q. 72. And I suppose that was why it was impressed upon your mind?

A. That is the only thing I would have to recall it to my mind.

(Mr. Pattison: That is all.)

JOHN A. MCDONALD, after being duly sworn on behalf of the defendant, testified as follows:

Direct Examination by MR. PATTISON:

Question 1. Please state your full name.

Answer. John A. McDonald.

Q. 2. Where are you now living?

A. Warren, Ohio.

Q. 3. What is your present occupation?

A. I am employed with the Trumbull Public Service Company.

Q. 4. State briefly what your duties with that company are.

A. Well, sir, they are mostly electrical construction work.

Q. 5. Were you at any time employed with the Warren Electric & Specialty Company at Warren, Ohio?

A. I was.

Q. 6. What period of time did your employment cover with that company?

A. From 1898 to 1911.

Q. 7. Did you accept work for the Peerless Electric Company?

A. I did, yes, sir.

Q. 8. You mean you constinued your service from the Warren Company to the Peerless Electric Company, down to 1911?

A. Yes, sir.

Q. 9. What material were the fan blades and spiders made of in the year 1898 when you went there?

A. Made of brass.

Q. 10. Did they make any change in that respect while you were with them in the manufacture of their fans, or any additions?

A. Yes, sir.

Q. 11. What was that change?

A. Well, they changed the center, in the first place. When I first went there, the center had three rivets in, then they made the center with two rivets in.

Q. 12. Was any change in the material made?

A. Yes, sir, they changed from brass to steel.

Q. 13. In connection with what fan was that change from brass to steel made.

A. It was in connection with a cheap fan they were going to put out, and I think, well, I am sure, they called it G-2 fan; G-2 and G-1.

Q. 14. What were your duties at the Warren Electric & Specialty Company?

A. Testing fans and fan motors.

Q. 15. Please explain to the Court just what you did there so that he can understand.

A. The fans were put in trays, and they went to what they call assemblers, who assembled or put them together. After they put them together, they came to me and I tested them for current, short circuit, speed, appearance, anything I could find wrong with them.

Q. 16. Of what material were the fan guards of these cheaper fans made?

A. Made of iron.

Q. 17. Did the fan guards have rings in them?

A. Yes, sir.

Q. 18. How were the ends of these rings connected in this cheap fan, as you remember?

A. Welded.

Q. 19. With what were they welded?

A. With the welding machine.

Q. 20. What caused that welding in that machine?

A. The current.

Q. 21. The electric current?

A. Yes, sir.

Q. 22. Did you see any of that welding done?

A. Yes, sir.

Q. 23. Did you do any of it yourself?

A. I did, but later on.

Q. 24. When was it you first saw this welding machine at the Warren Electric & Specialty Company's plant?

A. I would say it was in the early spring of 1901. Now, that may have been February or March.

Q. 25. Do you remember of seeing any catalogs of the Warren Electric & Specialty Company while you were there?

A. I have seen the catalogs, but I could not say now which ones they were.

Q. 26. I hand you a catalog and ask you if you know what it is? See if you recognize it?

A. (Examining catalog) This must be the 1901 catalog, although I do not see any date on it.

Q. 27. I think you will find the date on the front page.

A. Yes, sir, this is the season of 1901.

(Mr. Church: Just enter that the catalog referred to by the witness is the Warren Electric & Specialty Company's catalog for the season of 1901, and is Defendant's Exhibit No. 2.)

Q. 28. You say you saw and did butt welding on this machine?

A. Yes, sir.

Q. 29. How long after that machine was made, before you saw the butt welding?

A. Well, I would not say: it wasn't long.

Q. 30. Was that the first electric welding machine you had ever seen?

A. Yes, sir.

Q. 31. Were you interested in it?

A. Why, I had understood they were going to put out this cheap fan and they were going to weld the rings.

Q. 32. Were you interested in that machine?

A. No.

Q. 33. You examined it, I suppose?

A. I didn't examine the machine to any extent.

Q. 34. Was there any other kind of welding done on that machine that you know of?

A. Yes, sir.

Q. 35. What kind of welding?

A. Well, I would call it spot welding.

Q. 36. Did you see anything spot welded?

A. Yes, sir.

Q. 37. What did you see spot welded?

A. I saw Mr. McBerty spot weld one blade, not one blade. I mean by that one set of blades, the thing complete.

Q. 38. The four parts?
A. Yes, sir.

(Mr. Fish: That is not what he said; he said one set of blades.)

Q. 39. (By Mr. Church) Please explain what you mean by a set of blades?

A. One fan complete, four blades welded on one spider.

Q. 40. Did you see while you were there only this one complete set of blades spot welded?

A. No, sir, I saw more than that.

Q. 41. How did you happen to see it?

A. I saw them—well, I saw them when I used them, in fact. That is about the only time I saw them.

Q. 42. In what way did you use them?

A. I tested them on the fans, put them on the fans, and sent them through the factory.

Q. 43. You mean they reached you, and they passed through the factory, and you tested them? Is that what you mean?

A. I would not say they reached me when they went through the factory; they came to me from the stock room.

Q. 44. What was done with them after they came to you from the stock room?

A. I put them on the fans and sent them on through the factory.

Q. 45. How many do you think you put on fans—you mean on the motors?

A. Yes, sir.

Q. 46. How many did you put on motors and send to the stock room?

A. I would not say.

Q. 47. What would be your best recollection about that?

A. I would say a dozen or 12.

Q. 48. When these motors came to you, you say you put the spot welded blades on them?

A. Yes, sir.

Q. 49. Explain to the Court just exactly what you did do in that connection.

A. Well, sir, when I tested them, I always used the test blades that I knew were perfectly balanced and true and ran every fan with that one blade. The motor was all right; I took another finished blade and put it on the fan and ran it to see that it was all right. If it ran smooth, and all right, I passed them over to another bench where the guards were put on by another helper as they call them, and he puts the guards on and sends them back to me again. So, after I had tested half a dozen, and they ran all right, then they went to the packer.

Q. 50. You said you used a blade as a test blade. What kind of a blade was that that you used as a test blade?

A. I used one of these spot welded blades as a test blade for some time.

Q. 51. You remember that?

A. Yes, sir.

Q. 52. Am I correct in understanding that you put spot welded blades on fans and sent through to the stock room?

A. The fan blade I used then, the spot welded fan I used was not finished; that is, it was not japanned.

Q. 53. Did you put any japanned blades on the spiders?

A. Yes, sir. I put them on the finished fans; I got them from the stock room.

A. Yes, sir.

Q. 54. Spot welded?

A. Yes, sir.

Q. 55. How did these fans come to you; in what way were they brought to you?

A. Well, they went through the factory in trays; they came from the finishing department, the lacquering department, and they went then to the stock room, in trays, and when I got them, I got a whole tray at a time.

Q. 56. Did you or not regard the spot welds as serving the purpore of rivets?

A. I did.

Q. 57. On all these fans that you tested, that were spot welded?

A. Yes, sir.

Q. 58. Did any of those blades come loose while you were testing them?

A. No, sir, not to my knowledge.

Q. 59. Was your inspection the final inspection of the factory?

A. It was, yes, sir.

Q. 60. You were held responsible then for the goods going out in proper shape?

A. Yes, sir.

Q. 61. Did any bad work ever come back to you because not properly inspected?

A. Yes, sir.

Q. 62. Did any of these spot welded blades come back to you as not properly inspected?

A. Not to my knowledge.

Q. 63. Did any come back to you while you were with the Warren Electric & Specialty Company?

A. Not to my knowledge.

Q. 64. Or while you were with the Peerless Electric Company?

A. No, sir.

Q. 65. Were there other kinds of blades and fans that came back to you?

A. Yes, sir.

Q. 66. Have you a sufficient recollection of that welding machine to recognize any part of it?

A. I think I could recognize the machine.

Q. 67. I will ask you to examine this machine over here, and see what it is.

A. (Examining machine) I would say this is practically the same machine. (The witness refers to Exhibit B, McBerty Machine.)

Q. 68. What is there about that machine that enables you to recognize it?

A. Well, these handles, although two of them had wooden handles on, when I used it, and these jaws were apparently the same, only in the other jaws I used grooves.

Q. 69. You mean the jaws you used for the butt welding?

A. Yes, sir.

Q. 70. Did you ever do any spot welding upon that machine?

A. I did not.

(Mr. Church: That is all.

Cross-examination by MR. STACKPOLE:

X-Q. 71. Do you recall a visit to you in 1913 by Mr. McBerty and Mr. Howe?

A. Yes, sir.

X-Q. 72. Do you remember Mr. Howe?

A. I remember of him.

X-Q. 73. Did you tell him at that visit of this welding machine?

A. I did.

X-Q. 74. Did you tell him you had seen McBerty do spot welding on it?

A. I don't remember.

X-Q. 75. Did you tell Mr. Howe and Mr. McBerty then that you had used these spot welded blades and spiders in fans?

A. I would not say.

X-Q. 76. Did you tell him that you had used that spot welded blade and spider as a test?

A. I would not say, for Mr. Howe and Mr. McBerty came to me just on the spur of the moment, and it had been some time since I had thought about spot welding.

X-Q. 77. That was in 1913?

A. Yes, sir.

X-Q. 78. At that time you did recall these things?

A. I didn't recall them distinctly at that time. They took me by surprise by coming up to where I was. I was living in the country at that time and hadn't any chance to think about it.

X-Q. 79. And you did not give Mr. Howe an affidavit?

A. I think Mr. Howe wrote out an affidavit and I signed it.

X-Q. 80. You think he did?

A. Well, I know he did.

X-Q. 81. You know he did?

A. Yes, sir.

X-Q. 82. You have a distinct recollection of that?
A. Yes, sir.
X-Q. 83. Did you make oath to that affidavit before a notary?
A. I did not.
X-Q. 84. It was simply a statement then, and not an affidavit?
A. Yes, sir.
X-Q. 85. Did Mr. Howe take it away with him, or did you send it to him?
A. Mr. Howe took it with him.
X-Q. 86. After that, did you talk to Mr. McBerty to refresh your recollection as to these welding matters of 1901?
A. I did not.
X-Q. 87. When did you see Mr. McBerty last?
A. Last?
X-Q. 88. Yes.
A. This morning.
X-Q. 89. Did you talk with him at all about this matter in the last year or so?
A. Not to Mr. McBerty.
X-Q. 90. With whom did you talk?
A. Mr. Pattison.
X-Q. 91. Any one else?
A. One evening I talked to Mr. Church.
X-Q. 92. Did Mr. Pattison show you this 1901 catalog?
A. Not to my knowledge.
X-Q. 93. Did Mr. Church?
A. No, sir.
X-Q. 94. Is this the first time you have seen this catalog—today?
A. I think it is. I may possibly have seen it at the factory; I won't say.
X-Q. 95. That statement you gave to Mr. Howe, did you sign that at your place in the country?
A. I did.
X-Q. 96. But you didn't swear to it?
A. I know I didn't swear to it, for Mr. McBerty asked me to come to Warren and go and have it sworn to, and I told him I would the first time I was down to Warren. I didn't go to Warren for some time, and Mr. McBerty wrote to me. I remember of receiving a letter asking me if I would not come down to Warren and sign that or have it sworn to. The first time I went to Warren I went over to McBerty's office and Mr. McBerty was not there. He was out somewhere, I would not say now where.
X-Q. 97. You had the statement with you at that time?
A. I didn't, no, sir.
Q. 98. You expected to get it at Mr. McBerty's office?
A. Yes, sir, and I had to go back home again and I know it was dropped right there.

(The Court then took the noon recess.)

AFTERNOON SESSION.

The Court convened pursuant to the noon recess, at 1:30 P. M.; same parties present as before.

(The Court: Will the 31st day of July be a convenient date for counsel to argue this case?)

(Mr. Church: That will be very satisfactory to me. That is the time I shall go on my vacation.)

(Mr. Fish: Will your Honor allow two days if necessary?)

(The Court: If necessary. I am not encouraging two days.)

(Mr. Fish: I understand that. Neither are we, at least, I am not, but sometimes it takes longer than expected.)

(The Court: That is true. I will be here the evening before, so that we can have the full day without any restrictions of any kind.)

(Mr. Fish: By that time I think we will know how much time we ought to take. We can divide the time or not.)

(The Court: You can say a good deal in an eight-hour day—of course, if we have that length of day.)

(Mr. Fish: An eight-hour day is a killing proposition. The last two hours in this kind of work is generally wasted.)

(The Court: So long as you do not produce the same effect on me that another argument did a few weeks ago here. I had something very akin to dementia a few weeks ago.)

(Mr. Fish: I am satisfied an argument of too many hours is unfortunate both to Court and counsel.)

(The Court: Yes.)

F. P. McBERTY, recalled for further redirect examination, testified as follows:

Examined by MR. CHURCH:

Re-D. Q. 1206. Mr. McBerty, will you please examine the sample, Exhibit O, attached to your affidavit dated October 9, 1913, produced during your cross-examination today, and compare it with the sample, Defendant's Exhibit M, and state the result of

that comparison, and what, if any, relation one sample bears to the other?

A. The sample O indicates that it was cut off from the end of this sample M, as far as the thin section is concerned, the sheet section, and the heavy section or piece spot welded to the back of the thin section has the appearance of having been cut off from the spider arm of M. The parts match—

(The Court: One of the spider arms?)

(The Witness: One of the spider arms, yes, your Honor.)

Re-D. Q. 1207. (By Mr. Church.) How do you account for the discoloration, or difference in surface appearance of those several samples?

A. The discoloration would be due to the heat induced by the spot welding. You raise a piece of metal to a certain temperature, and it turns blue.

Re-D. Q. 1208. Why do you say that the sample of the fragment of spider arm shown on this sample Exhibit O was at one time attached to the spider of Exhibit M; what indication is there?

A. The spider arms shows a cut as though the piece in question had been partly severed with a pair of shears or a tinner's tool, and the balance broken off and both sections show practically the same mark or indication, and there is a hole through the center of the spider arm attached to Exhibit M, which is cut partly through, and the balance of the grooved recess is on the small piece attached to Sample O which would indicate very clearly they were the same piece originally.

Re-D. Q. 1209. Is either of the samples that have been produced by the plaintiff in connection with your affidavit the sample that was sent by you to Mr. McGill, as testified by you yesterday?

A. Neither. Neither of the samples fits the center section, and the sample Mr. McGill had would fit this in the condition it was when I sent it to him.

Re-D. Q. 1210. Your affidavit of October 9, 1913, and the sample exhibits annexed thereto were produced during your cross-examination by counsel for plaintiff after you had produced your sample "Defendant's Exhibit M" on your direct examination, were they not?

A. They were.

Re-D. Q. 1211. Will you please explain to the Court fully why you did not give to nor show to Mr. Howe the sample, Defendant's Exhibit M?

A. When we first went into the welding business, the National Electric Welder Company engaged in the manufacture of spot welding machines at Warren, Ohio, they knew nothing about the patent business; very shortly after that, information came to us

of the litigation in the spot welding field, and gave us the impression we might eventually be involved in something of the kind ourselves. I will refer to this electric welding machine at the same time. As soon as this information came to us, I thought it policy to round up everything in the shape of information that I could possibly secure, regarding my early use of this spot welding work, and I purchased the spot welding machine or the electric welding machine that is shown here as exhibit—whatever the number of the exhibit is—as my first experience along that line. Later on, suit was entered against the Toledo Company under the Harmatta patent, or rather, suit was begun against Barney & Berry Company and the Toledo Company, and defended by the Toledo Company, suit being brought by the Thomson Electric Welding Company, and this, of course, interested us directly, for the simple reason if this suit was sustained, we would be in trouble, as far as the patent situation was concerned. The General Fireproofing Company of Youngstown, Ohio, who have a number of the machines, and who were at that time our best customer, were close by, and were apparently much interested in the patent situation also. I saw Mr. A. C. White, who is a mechanical engineer, and talked this matter over with him about this time, and suggested I see his brother; I don't remember his initials, but I think he is vice-president or president, or was at that time, of the General Fireproofing Company, and his offices were in New York City. Mr. White later on advised me that his brother would be in Youngstown, and asked me to come down and see him, which I did, and we talked over this patent situation, and I advised him at that time regarding my former use of spot welding and told him I had the machine, had the samples, and what we had done in the way of spot welding the blades; that is, gave him an idea that the work was not new or novel and could be carried on to advantage. Mr. White looked over the sample and he also looked over the affidavits that I personally had taken from Mr. Brown and Mr. Lipps, regarding the prior use, and suggested that for their own protection they would like to have those samples and affidavits left in their possession. I consulted with our Mr. J. Nota McGill, regarding this, and he was not favorable to the idea of letting those samples at that time go out of my hands. When this suit had been entered against Barney & Berry Company, the General Fireproofing Company sent a couple of representatives to Cincinnati, apparently to purchase some welding machines, but in reality, to talk over with them the patent situation with a view of finding out what effort was going to be made to protect the users of spot welding machines. They talked to Mr. Warren, I think, at least to the man in authority down there, along these lines, and finally suggested the fireproofing company would be glad to contribute towards a fund to be used as a defense fund in this suit, and the only stipulation they made was they be permitted to participate in the defense. This the Toledo Company refused to do. In fact, Mr. White tells me they absolutely refused to consider the proposition at all.

(Objected to.)

Re-D. Q. 1212. Just confine yourself to what you know, not what somebody told you.

A. Anyhow, the representatives returned and reported there was no deal on, and Mr. White very shortly after that suggested that he would again be much interested in having that sample in his own hands with that information. We referred the matter to Mr. McGill, and Mr. McGill did not consider it a reasonable proposition. Later on, the matter of looking out for our own defense was brought up, the suggestion was made we send to Mr. McGill the samples and the information we had at hand, with a view of having him approach the attorneys of the Thomson Electric Company, and also the attorneys of the Toledo Company, with a view of either getting protection or immunity from litigation in some way, and relieving ourselves of the situation that was liable to cause us trouble. When the matter was brought up, we sent the sample to Mr. McGill and mentioned it to Mr. White, and he absolutely refused to consider that as being a practical solution. He said, "Do not send them." He said, "If you ever get them in the hands of the Toledo people, they are crooks, you will never get them back." Those are the words, as near as I can repeat them, of Mr. White. Mr. McGill suggested in place of giving up the complete sample we cut the sample in two, he retaining a portion of the sample, and we the other, and this was done. We retained that in our possession, that is, the National Company retained it in its possession, this sample known as Exhibit M, and it was in our possession until it was turned over finally to the attorneys in the suit in question. I might mention if that sample had been turned over, it would have been very hard to find it at the present time.

Re-D. Q. 1213. When you were making your test on this machine at the Ford plant yesterday, something was said about the heating of the machine. Tell the Court what provision is made in modern spot welding machines for preventing over-heating, due to frequent use?

A. The transformers of course are built with much greater capacity than this machine has, and the welding points, the electrodes, are so arranged that a stream of cold water passes through them or near to the point of radiation.

Re-D. Q. 1214. So, there being no cooling means on this old machine, it could not be operated so fast without over-heating as modern machines, is that true?

A. No, that machine would not operate successfully as a spot welder, pulling the quantity of current such as I made yesterday, for any length of time without excessive heating.

Re-D. Q. 1215. In your affidavit of October 9th, 1913, there is a statement on page 5 to this effect, relating to the obtaining of the welding machine from the Peerless Company:

"A few years ago I am informed it was taken down because the Peerless Company decided to buy their guards instead of making them, and the welding machine was placed in the stock room. It was there when I bought it in 1911 and has been in my possession at the works of the National Electric Welder Co. ever since."

What did you mean by that expression "stock room"?

A. They have a third floor in the building where the fan motor department was located, and this third floor is used for the storing of fans, out-of-date fans that are returned as defective, and such obsolete machines as they do not use in the present methods of construction.

Re-D. Q. 1216. The wording of that affidavit is not yours?

A. I mentioned the fact the machine had been scrapped; it wasn't in use, and they anticipated disposing of it as scrap later on.

Re-D. Q. 1217. I mean to say the actual language used in this affidavit is not yours, is it?

A. Oh, no.

Re-D. Q. 1218. Who drew the affidavit?

A. That affidavit there was drawn by Mr. Howe.

Re-D. Q. 1219. That is in his language?

A. Yes, sir.

Re-D. Q. 1220. Expressing the ideas you communicated to him?

A. Yes, sir.

Re-D. Q. 1221. In the course of your cross-examination reference was made to a Mr. Smith at one time; some of us did not know what Mr. Smith was referred to. Do you recall what Mr. Smith was in your mind when you were speaking?

A. I was referring to a man named Newton A. Smith.

Re-D. Q. 1222. Who was he?

A. He was a man employed by the Thomson Spot Welder Company, apparently a Secret Service man, or spy, who entered the employ of the National Company to secure such information as was available in searching through our files and records.

(Mr. Fish: You say Mr. Smith was referred to in cross-examination?

(Mr. Church: I think so.)

(Mr. Fish: No, no, not by me, no reference was made to him.)

A. I referred to Mr. Smith, Newton A. Smith.

(The Court: He spoke of a Mr. Smith. Go on with your story.)

Re-D. Q. 1223. How long was Mr. Smith with you?

A. (Referring to a telegram.) N. A. Smith was in our employ from March 9th to June 13th, 1917, as per his affidavit. I am referring to a telegram I received from the home office.

Re-D. Q. 1224. What affidavit is that referring to?

A. Mr. Smith made an affidavit for the benefit of the Thomson Company in a suit brought against the National Electric Welder Company in Cleveland.

Re-D. Q. 1225. And he in that affidavit referred to the fact he had been in the employ of the National Electric Welder Company in Cleveland?

A. He did.

Re-D. Q. 1226. And he gave in great detail the spyings and doings, did he not, on that company?

A. He did.

Re-D. Q. 1227. State in a general way what he did while he was there, of which you have knowledge?

A. He was employed there as a mechanic or foreman of the plant, and when he first came there I asked him if he had any connection with the Thomson Electric Welding Company or the Spot Welder Company, the General Electric Company or the Westinghouse Company, and his reply was he had absolutely no connection with them and knew nothing about the companies in question.

Re-D. Q. 1228. Did he seem to be a competent person?

A. He seemed to be a reasonably good mechanic.

Re-D. Q. 1229. Upon those representations, you employed him?

A. Upon those representations, I employed him; he worked with us for some months, and we found at one time Mrs. McBerty, who had charge of the office there, came back unexpectedly in the evening, just after quitting it, and found Mr. Smith with the safe open. He was much embarrassed and suggested she forgot to lock the safe. She did happen to know she had forgotten to lock the safe, but she knew she had not left it standing open, although it was standing open when Mr. Smith was there. She also found Mr. Smith looking through the papers and correspondence on my desk.

(Mr. Stackpole: This is objected to as not within the knowledge of the witness.)

(The Court: It is all secondary. If you object to it, I will sustain it.)

(Mr. Stackpole: We object to it.)

(The Court: It may go out.)

Re-D. Q. 1230. Has that Mr. Newton A. Smith been in attendance on this trial?

A. He has.

Re-D. Q. 1231. Will you please point him out?
A. Mr. Smith is the man standing up here.

Recross examination by MR. STACKPOLE:

Re-X. Q. 1232. You have referred to the affidavits of Messrs. Brown and Lipps, taken by you.
A. Yes, sir.
Re-X. Q. 1233. Were those the same affidavits that were taken by Mr. Howe, of Messrs. Brown and Lipps?
A. No, I took some affidavits myself, early, that is, in 1912, I think, with reference to the prior use of the welding machine.
Re-X. Q. 1234. Have you copies of those affidavits?
A. I have not with me.
Re-X. Q. 1235. Will you get them and send them to the clerk?
A. I will be glad to.
Re-X. Q. 1236. The originals. What we want are the originals.

(The Court: Yes, the originals.)

(The Witness: I think the originals were turned over to these people.)

(Mr. Fish: Oh, no.)

(The Court: Mr. McBerty says that is not the affidavit turned over to these people.)

(Mr. Fish: These were taken in 1912 by Mr. McBerty himself.)

(The Court: Let us find out what he did with those. Ask him the question.)

Re-X. Q. 1237. What became of the affidavits that you say were taken by you yourself?
A. The originals were turned over to Mr. J. Nota McGill.
Re-X. Q. 1238. For what purpose?
A. To enable him to get in touch with the Thomson representative and Toledo people.
Re-X. Q. 1239. Have you ever seen them since?
A. Not to my knowledge.
Re-X. Q. 1240. You have not got them in your possession now, the originals?
A. No, I have not the originals.

(Mr. Fish: You have copies?)

A. Yes, I am quite positive.
Re-X. Q. 1241. That you know are copies?

A. Yes, sir.

Re-X. Q. 1242. I would like to have you send them to the clerk, if you know they are copies.

A. Yes, sir. How will they be addressed?

(The Court: Send them to the clerk with the title on the outside of the envelope, made by you.)

(Any further cross-examination?)

(Mr. Stackpole: I think not, your Honor.)

ALBERTAS C. TAYLOR.

ALBERTAS C. TAYLOR, after being duly sworn on behalf of the defendant, testified as follows:

Direct examination by MR. PATTISON:

Question 1. State your name, please.

Answer. Albertas C. Taylor.

Q. 2. Where do you live?

A. Warren, Ohio.

Q. 3. What is your present business?

A. Vice-president and general manager of the Taylor Welder Company.

Q. 4. Have you anything to do with electrical welders?

A. Yes, sir.

Q. 5. When did you first see an electric welder?

A. In 1903.

Q. 6. Where did you see that?

A. At the Peerless Electric Company at Warren, Ohio.

Q. 7. When did you go to work for the Warren Electric Company?

A. I am not sure whether it was the Warren Electric Company or the Peerless Electric Company; I believe it was the Peerless.

Q. 8. When did you go to work for the Peerless Electric Company?

A. In May, 1903.

Q. 9. How long did you remain with the company?

A. Until the fall of that same year, or about six months.

Q. 10. Where did you then go?

A. I went then to what was known as the Barr Judd Co. They were just entering in the manufacture of conductor pipes and elbows.

Q. 11. Were you later connected with the Winfield Electric Welder Company?

A. Yes, sir.

Q. 12. Who designed the welders for the Winfield Company?

A. I did.

Q. 13. And where did you first learn about the construction of electric welders?

A. At the Peerless Electric Company.

Q. 14. In 1903?

A. Yes, sir.

Q. 15. Did you do any work on this welder?

A. Yes, sir, I operated on several occasions.

Q. 16. What kind of welds did you make on it?

A. I made what is known as the regular butt weld, the same as they used in the manufacture of the rings for fan guards. Also made welds like crossing wires in between the two electrodes, and also on flat sheets by laying them face to face and placing them between the two jaws of the clamp and dies.

Q. 17. Can you produce samples of the work that you did in 1903 on this machine?

A. No, I can not.

Q. 18. I do not mean original samples.

A. No.

Q. 19. And have you any samples with you?

A. I have made samples that were very similar, as near as I can remember, to what I produced at that time.

Q. 20. Will you produce them?

A. Yes, sir (producing samples referred to).

(Mr. Stackpole: We do not think these are competent, being reproductions.)

(The Court: When do you say you made that?)

A. That was made about ten days ago.

Q. 21. And that is representative of what?

A. Of the work done at the Peerless Electric Company in Warren, Ohio.

Q. 22. On what machine?

A. On what is known as D-6, Winfield Butt Welder.

Q. 23. And this was done on the Winfield Butt Welder?

A. Yes, sir.

Q. 24. What do you want this for? You bring this in here to represent what you once did on this old machine? Is that it?

A. Yes, sir, as nearly as I can remember.

(Mr. Stackpole: I think that is objectionable, your Honor?)

(The Court: Well, I don't know. I think it may stand. Go on.)

Q. 25. (By Mr. Pattison.) Is this a fair representation of the butt welding work that you did at the Peerless?

A. I would say it was.

Q. 26. Will you examine this machine, Defendant's Exhibit B, McBerty Machine, and state whether that is the machine on which

you did work represented by this sample you have just produced?
A. Yes, sir, that is made on practically the same machine.

(Mr. Pattison: I offer this exhibit as Defendant's Exhibit 63, a representation of butt welding done by the witness on the McBerty machine in 1903.)

Q. 27. You also referred to welding cross wires. Can you produce a sample representative of the work you did of that character?
A. Yes, sir; this is a sample and represents welds, as near as I can remember, of the kind made at that time.
Q. 28. On the McBerty?
A. On the McBerty Welder at the Peerless plant.
Q. 29. Is this a fair representation of the work you did at that time, as you remember it, on the McBerty machine?
A. Yes, sir.

(Mr. Pattison: This sample is offered as Defendant's Exhibit 64, as representative of the cross wire welding done by the witness on the McBerty machine.)

Q. 30. You also referred to welding sheets together. Can you produce a sample representative of the work done on that machine?
A. Yes, sir; here is the sample (producing).
Q. 31. On what machine did you do this kind of work?
A. On the same machine, No. D-6, Winfield Electric Welder.
Q. 32. Do I understand you did work of which this is a fair representation, on the McBerty machine in the year 1903?
A. Yes, sir.
Q. 33. At the Peerless factory?
A. Yes, sir.

(Mr. Stackpole: I would like to object to that on the ground of immateriality.)

(Mr. Pattison: It goes as to the weight.)

(Mr. Stackpole: On what issue?)

(Mr. Pattison: On what it would do. I might state primarily the object of putting this witness on is to show that beginning with his knowledge of the McBerty machine, he carried it through.)

(The Court: One period in the history of the machine?)

(Mr. Pattison: One period in the history of the machine, and that he produced, commercially, machines of this type. He went into the Winfield Company and designed machines from the knowledge he got here and put out commercial machines.)

Q. 34. Is this a fair representation of the work which you did on the McBerty machine in 1903 at that factory?

A. Yes, sir, as near as I can remember.

(Mr. Pattison: The sample is offered as Defendant's Exhibit 65, representation of welding plates on the McBerty machine by the witness Taylor in 1903.)

Q. 35. Will you please explain to the Court how you operated this machine to make the weld on this Exhibit 65?

A. I laid the two plates face to face, and placed them down edgewise between the two vertical holding dies, and operated what is known as the opposite levers, to bring pressure upon the plate, and at the same time, passed the current through the dies and through the plates and produced the weld.

Q. 36. What time did you go over to the Winfield Company after you left the Peerless Company?

A. In, I would say, about February of 1904.

Q. 37. What work did you do at the Winfield Company when you went there?

A. I was foreman of the machine shop, also did designing.

Q. 38. What kind of designing?

A. Designed new tools, dies, and so forth.

Q. 39. Did the Winfield Company, after you went there, start in the manufacture of electric welding machines?

A. Yes, sir.

Q. 40. When?

A. About, I would say, three or four months, or possibly six months afterwards.

Q. 41. Who designed these electric welding machines for the Winfield Company?

A. I did.

Q. 42. When did you begin the work of designing these machines for the Winfield Company?

A. In about the month of August.

Q. 43. Of what year?

A. Of 1904.

Q. 44. And when, or for what purpose, were these welding machines first made by you?

A. The purpose we intended to put the machines to was for welding fenders and on a white lead holding case, to make it liquid-tight.

Q. 45. What was the next use of electric welding machines at the Winfield Company's plant?

A. The next use of that same machine was to make spot welds.

Q. 46. On what?

A. On white lead kegs, and on elbows, such use as that, stove-pipe elbows.

Q. 47. Were the Winfield Company manufacturing stove-pipe elbows then?

A. Yes, sir.

Q. 48. Can you produce a sample of the spot welding on the stove-pipe elbows that you did at the Winfield Company?

A. Not that I did at that time, no.

Q. 49. Can you produce stove-pipe elbows representative of that work?

A. Yes, sir.

Q. 50. Please do so. (Witness produces same.)

Q. 51. Will you please point out to the Court where the spot weld is on the sample you have produced?

A. The spot welding is in the throat or narrow portion of this section of an elbow.

Q. 52. At the overlapping seam?

A. Yes, sir.

Q. 53. To what extent was this spot welding used for this elbow work?

A. Why, it was used to a considerable extent on the same type of elbows that had the narrow throat. The reason we used that was in the making of this elbow we locked the parts together by a wheel that traveled around, and heretofore we had riveted these parts together, and the rivet would project, that is, the head of the rivet, and the wheel would strike it and sometimes knock the piece out of the machine, and consequently, spoil the elbow, so we conceived the idea of putting spot welds there, which would do away with the rivets, which would have no projection to interfere with the wheel passing around the elbow.

(Mr. Pattison: The first sample elbow, introduced by the witness, is offered in evidence as Defendant's Exhibit 66, Sample of Spot-welded Elbow.)

Q. 54. Can you show to the Court by sketch what you have just explained of the rivet interfering with the machine for forming this elbow?

A. Yes, sir; I have a copy of tracing or a drawing that I made to illustrate this work.

Q. 55. When was this drawing made?

(Mr. Fish: I understand, may it please your Honor, it is distinctly stated by the defendant this is not set up as an answer to the Harmatta patent. This testimony is not competent, if it is not set up in the Answer.)

(The Court: I understand it is not offered for that purpose at all.)

(Mr. Church: It is to show the development of the art.)

A. That drawing, I would say, was made about a year or a year and a half ago.

Q. 56. I notice on this sheet a representation of some sort of machine. What does that represent?

A. That represents the first welder that we built.

Q. 57. What do the dotted lines show on that sketch?

A. The dotted lines represent wheels or rollers which were used for making the fenders.

Q. 58. What do these projections represent?

A. They represent electrodes that took the place of the wheels or rollers in making the spot welds.

(Mr. Pattison: The drawing referred to by the witness is offered as Defendant's Exhibit 67, Drawing of Stove-Pipe Elbow and also First Welding Machine.)

Q. 59. Have you any parts of the original machine represented by that drawing?

A. I have.

Q. 60. Will you produce it?

A. Yes, sir. (Producing.)

Q. 61. When was this machine made, which you have produced, which you have shown?

A. That machine was produced in 1903, or the early part of 1904.

Q. 62. And was it on this machine that the spot welding of the elbows was made?

A. Yes, sir.

Q. 63. Did any of these elbows go out to the trade?

A. Yes, sir, a great many of them.

Q. 64. After making this machine, what was your next development in electric welding machines?

A. The next machine was a butt welding machine.

(Mr. Pattison: This machine is offered as Defendant's Exhibit 68, Taylor First Welding Machine.)

Q. 65. Can you produce a drawing of this butt welding machine to which you have referred?

A. I have a sketch made of the machine, as near as I can remember, as it was at that time.

Q. 66. When did you make a machine corresponding to that sketch?

A. This machine was made, I would say, in 1904, possibly in the middle of the year or the latter part of it.

Q. 67. Was it used after being made?

A. Yes, sir, it was used for butt welding, what we would call fenders for the bending machine, introducing elbows.

Q. 68. Was it used for any other purpose?

A. It was also used a little later for spot welding.

Q. 69. Spot welding what?

A. Spot welding the seam of these elbows, and what was known as the one-piece elbow.

(Mr. Pattison: This drawing is offered in evidence as Defendant's Exhibit 69, Sketch of Taylor Combined Butt and Spot Welding Machine.)

Q. 70. This machine, as represented by the physical exhibit and the sketch, were they made for the purpose of the manufacturing at the Winfield plant, or for some other purpose?

A. These were made for the Winfield Manufacturing Company for their own use.

Q. 71. What did they manufacture?

A. They manufactured oil cans, lanterns, stove-pipe elbows.

Q. 72. After making the butt welding machine, what, if anything, did you do then in the development of electric machines?

A. We then built or started to place on the market spot welding machines and offered them to the trade.

Q. 73. About when was that?

A. This was in the year, about 1906 or 1907, that we started putting the machines on the market.

Q. 74. Have you any of those machines you made at that time? The original machines?

A. Not as I know of. We haven't. Of course, some of them are in use today.

Q. 75. Were any of these machines made in 1906 sold?

A. Yes, sir, but they were not sold, I don't think in 1906.

Q. 76. Were they offered for sale in 1906?

A. They were offered for sale, as I remember.

Q. 77. Were any of them sold later?

A. Yes, sir.

Q. 78. About when?

A. The year of 1908.

Q. 79. Were any placed in the hands of the public before you actually made sales?

A. Yes, sir. We had considerable trouble in getting customers. The manufacturers were very skeptical of it at first, and they seemed to be all waiting to have some one else try it out first, and would see if their competitor was using it, and they also were afraid the parts would not hold together. They were afraid to put it in their product, afraid it would injure their business.

Q. 80. And because of that, you let them try them out before they were sold?

A. Yes, sir, they were put out on trial, and placed without orders, to let them try them out.

Q. 81. Did any of them buy them after you let them have them for a while?

A. Yes, sir.

Q. 82. Can you produce a sketch of the first machine that was commercially sold by the Winfield Company?

A. I have a drawing or sketch here, as near as I can remember it, of the first machine that we made and sold.

Q. 83. Did you sell a machine constructed like that?

A. Yes, sir.

Q. 84. How many do you suppose you sold in 1908 like that?

A. I would say one or two, not over that, I don't think.

Q. 85. Did the Winfield Company continue in the manufacture and sale or offering for sale of these spot welding machines?

A. Yes, sir, of all kinds.

Q. 86. At the time the Winfield Company placed these machines on the market, was there, to your knowledge, any other spot welding machine on the market?

A. No, sir.

Q. 87. Did you know of any other way of making or welding the plates together at that time?

A. I did not.

(Mr. Pattison: This sketch is offered as Defendant's Exhibit 70, Drawing of First Spot Welding Machine placed on the Market by the Winfield Manufacturing Company.)

Q. 88. Was that the name?

A. I believe it was at that time. I am pretty sure the first machines were put out by the Winfield Manufacturing Company, and later, the Winfield Welding Company was organized.

Q. 89. Is the Winfield Company still a manufacturing and selling spot welders?

A. No, sir, not for spot welding purposes. They do use a spot welder for welding and other work which is not considered spot welding.

Q. 90. That is all.

(The Court: Didn't I see a machine on Monday at the plant where we were with the Winfield plate on it?)

(The Witness: I don't know where it was. We have about 75 of those machines here.)

(The Court: I saw a machine there with the Winfield plate on.)

(Mr. Church: I guess you must have seen that at the Ford plant. It was for the use of the Winfield machine that the Ford Company was sued.)

(The Court: It was on Monday I saw it.)

Q. 91. Were there any Winfield machines at the place we visited on Monday?

A. I didn't see any, no, sir. They were all Thomsons.

(Mr. Stackpole: There were a number there, I understand, and you may have seen them.)

(Mr. Pattison: Am I correct in understanding that your knowledge of electric welding began with the McBerty machine and then you went to the Winfield people and carried it forward with the Winfield machines that were sold by the Winfield people?)

A. Yes, sir, that was the first machine I ever saw.

Cross-examination by MR. FISH:

X-Q. 92. Were you ever associated with the National Electric Welder Company?

A. Yes, sir.

X-Q. 93. When?

A. When it was organized.

X-Q. 94. When was that?

A. I think that was 1911.

X-Q. 95. In 1911?

A. I believe so.

X-Q. 96. Who was associated with you in that company?

A. A man by the name of W. A. Wilson, and Fred P. McBerty and Newton A. Wolcott.

X-Q. 97. How long did you stay with that company?

A. About one year.

X-Q. 98. What was your position in that company?

A. I think I was president.

X-Q. 99. You were president?

A. Yes, sir.

X-Q. 100 Do you know anything about the purchase of this welding machine, Exhibit B, by the National Electric Welder Company?

A. Yes sir.

X-Q. 101. What do you know about it?

A. Of course, I had seen the machine at the Peerless plant, and I knew that Mr. Wolcott, not Mr. Wolcott, but Mr. McBerty, wanted to buy the machine.

X-Q. 102. Do you know why he wanted to buy it?

A. Yes, sir, as a kind of protection to the company.

X-Q. 103. In what respect?

A. To prove that he had made spot welding, or that he had proof that it was the machine that he had done spot welding on.

X-Q. 104. That is, he wanted the custody of the machine as the one he had spot welded on?

A. Yes sir.

X-Q. 105. Is that all you know about as the reason for buying it?

A. I believe so.

X-Q. 106. What do you say?
A. I think so.
X-Q. 107. When did you first see welding on that machine yourself?
A. In 1903.
X-Q. 108. Where was the machine then?
A. At the Peerless Company.
X-Q. 109. You have told the whole story?
A. Yes sir.
X-Q. 110. Did you ever say that machine was bought for the National for the purpose of putting it up as a bluff in connection with this litigation?
A. Not that I remember of.
X-Q. 111. You don't remember of saying that?
A. No, sir.
X-Q. 112. You didn't say it to Mr. Newton A. Smith, or words to that effect?
A. I don't know as I did.
X-Q. 113. Did you say it to Mr. McBerty, that is, the way it was done?
A. I don't think I did.
X-Q. 114. What?
A. No, sir.
X-Q. 115. Do you swear you didn't?
A. Yes sir.

(Mr. Stackpole: May I ask the witness some questions on another point, your Honor?)

(The Court: Yes. There is no objection.)

X-Q. 116. Was it in 1904 you developed this machine with rollers?
A. Yes sir.
X-Q. 117. And afterwards you changed it over to a spot welder?
A. Yes sir.
X-Q. 118. And that spot welder was the first use you had made of a spot welder, made by the Winfield Company?
A. Yes sir.
X-Q. 119. Did you discontinue the use of the rollers?
A. I did temporarily.
X-Q. 120. Temporarily?
A. Yes, sir, that is, we used it off and on with rollers.
X-Q. 121. Did you use the spot welders for the same work, for welding parts of the stove pipe, whatever it was?
A. No.
X-Q. 122. What was the shape of the periphery of the rolls?
A. I think one was flat and one was a little oval, the conductors, that is, the surface.
X-Q. 123. That is all.

Redirect examination by MR. PATTISON:

Re-D. Q. 124. I notice this machine you have produced appears to have only one electrode?

A. Yes sir.

Re-D. Q. 125. How about that missing electrode?

A. I don't know. I imagine it has been lost, as the machine lay around a long time.

Re-D. Q. 126. It would have it on in 1904 when you operated it?

A. Oh, it would have to have it. The hole shows the place for it.

Re-D. Q. 127. And it was between those two electrodes you did the spot welding?

A. Yes sir.

(Mr. Pattison: That is all.)

JOHN S. GILDER.

JOHN S. GILDER, after being duly sworn on behalf of the defendant, testified as follows:

Direct examination by MR. PATTISON:

Question 1. Where do you now live?

Answer. In Warren, Ohio.

Q. 2. How long have you lived there?

A. I have been in Warren, Ohio, most of the time since 1900.

Q. 4. You were with the Warren Electric & Specialty Company in 1900? What did you do?

A. I went to work for the Warren Electric & Specialty Company.

Q. 5. What work did you do in 1900?

A. I went to work in the fan motor department.

Q. 6. Did you know at that time the material of which the blades and spiders were made at the Warren Electric & Specialty Company in 1900?

A. I didn't work on that part of it.

Q. 7. Did you know of what material the fan blades were made at that time?

A. They were brass.

Q. 8. Of what material were the spiders when you went there?

A. If I remember right, they were cast bronze, or bronze.

Q. 9. This was in 1900?

A. Yes sir.

Q. 10. Was any change made in respect to the material for fan blades and spiders after 1900?

A. In 1901 there were pressed steel blades and spiders of iron and steel guards.

Q. 11. What kind of fans were so made?

A. They were called G-1 and G-2, I believe.

Q. 12. Was it as expensive a fan as the brass fan?

A. I don't imagine it was. It was cheaper material.

Q. 13. Did you have anything to do with making the fan guards for this steel-bladed fan?

A. At times I did, yes, sir.

Q. 14. What work did you do on it?

A. I welded some of the rings and arms, whatever you call them.

Q. 15. How did you weld them?

A. On an electric welding machine.

Q. 16. Did you do much of this work?

A. Well, at times I did. I helped out. My work was making brass guards.

Q. 17. Can you give us an estimate, as nearly as you can, of how many electric butt welds you think you made in 1901?

A. That would be difficult to say.

Q. 18. Can you give us some idea?

A. No, I don't believe I could.

Q. 19. Would it run into the hundreds?

A. Oh, yes, I should say it would run into the hundreds. I worked a half day or so at a time.

Q. 20. Did the machine work all right for that purpose?

A. Yes sir.

Q. 21. And what year was that?

A. That was in 1901.

Q. 22. The year after you went with the company?

A. Yes sir.

Q. 23. And you went with the company the first year you came to Warren, in 1900?

A. Yes, sir, the early part of 1900.

Q. 24. The operation of this machine, I suppose, made you familiar with it?

A. Yes sir.

Q. 25. Do you think you would recognize the machine now?

A. I think I would, yes, sir.

Q. 26. Will you please examine this Exhibit B and state what it is?

A. That is the machine, with the exception of those handles or cam levers, as they are called.

Q. 27. Would you say it was this machine you worked on?

A. I should say it was.

Q. 28. That is the machine then that you operated for butt welding in 1901?

A. Yes sir.

Q. 29. Do you know whether any other kind of welding was done on this machine?

A. I saw no other kind of welding done on it.

Q. 30. Did you see any other kind of welding that had been done on it?

A. I saw some fan blades that had been electric welded, that is, spot welded, on to the hubs.

Q. 31. How many do you think you saw?

A. I could not say definitely. I saw them in a crate or tray, as we call them, as they were used for carrying them through the shop and getting them from one place to another.

Q. 32. Did you examine them when you saw them?

A. Yes sir.

Q. 33. To what extent did you examine them?

A. Well, I had them in my hand and looked them over.

Q. 34. For what purpose were the spot welds on the blades?

A. To do away with riveting.

Q. 35. Did that do away with the riveting?

A. Yes sir.

Q. 36. Did they seem to serve the purpose of riveting?

A. They looked all right, yes, sir.

Q. 37. Did you see these blades afterwards?

A. No, sir, I don't remember of seeing them after they were in these trays.

Q. 38. Was this the first electric welding machine you ever saw?

A. Yes sir.

Q. 39. And that attracted your attention?

A. Yes, sir; I had no knowledge at all of the electric welding business.

Q. 40. Did you see any one do any spot welding on this machine?

A. No, sir, I didn't.

Q. 41. When was it you saw these spot-welded blades?

A. I would say it was shortly after the machine came into use, the early part of 1901.

Q. 42. What was the tray used for in the factory of the Warren Electric & Specialty Company?

A. For conveying blades around to the different operations.

(The Court: For assembling purposes?)

(The Witness: Yes, sir.)

Q. 43. Was there as many as a tray full when you saw them?

A. Well, I could not say as to that.

Q. 44. What is your recollection of it?

A. Well, I would say, as near as I can recall, there was more than one, and there might have been a dozen. Somewhere, eight or ten or a dozen, as near as I can remember.

Q. 45. Did this electric welding machine attract any attention in the fan department?

A. Yes, sir, it did at first. It was new to most of us.

Q. 46. How did the spot welding with that attract attention there?

A. Well, it was talked of among the boys.
Q. 47. Was all this done the first year the cheap fans referred to were made?
A. This welding?
Q. 48. Yes.
A. Yes, sir.

(Mr. Pattison: That is all.)

Cross-examination by MR. STACKPOLE:

X-Q. 49. Did you tell your story to Mr. McBerty, about this welding machine in 1913?
A. At the time—at what time?
X-Q. 50. When Mr. Howe was there?
A. Yes, sir.
X-Q. 51. And you told Mr. Howe and Mr. McBerty everything you remembered?
A. To the best of my ability.
X-Q. 52. You covered the entire situation?
A. As near as I could recollect at that time, yes, sir.
X-Q. 53. You disclosed everything you knew at that time?
A. As far as I could recollect, yes, sir.
X-Q. 54. Did you tell Mr. Howe and Mr. McBerty about seeing these welded blades and spiders?
A. Seeing them?
X-Q. 55. Seeing them after they were welded. Did you tell them then you had seen them after they were welded?
A. I don't recollect as to that.
X-Q. 56. Did you tell them about the welded blades and spiders being carried on the trays?
A. I don't remember that.
X-Q. 57. Did you tell them about the boys in the shop talking about it?
A. I could not say as to that.
X-Q. 58. In the last year or two or three have you discussed the matter of what you saw in 1901, concerning the work, with anybody?
A. Yes, sir.
X-Q. 59. With whom?
A. With Mr. Pattison and Mr. Church.
X-Q. 60. With Mr. McBerty?
A. It was in his presence.
X-Q. 61. General consultation?
A. Yes, sir.
X-Q. 62. Did any of them show you these catalogs, or this catalog of 1901?
A. I believe I did see that catalog.
X-Q. 63. At that time when you had that consultation?

A. I am not sure it was just at that time, but I remember of seeing one of the catalogs.

X-Q. 64. When did you have this consultation?

A. I could not give you the exact date.

X-Q. 65. No. But what year?

A. When?

X-Q. 66. When Mr. McBerty was present?

A. I should say it was a couple of years ago.

X-Q. 67. Nineteen seventeen?

A. Yes, sir.

X-Q. 68. Not earlier than that?

A. No, sir.

X-Q. 69. And you went over the entire situation at that time with Mr. McPerty and with Mr. Pattison?

A. Yes, sir.

X-Q. 70. And Mr. McBerty was present?

A. Yes, sir.

X-Q. 71. Did you make an affidavit in 1913 which you gave to Mr. Howe?

A. I believe that is about the date, yes, sir.

X-Q. 72. Was Mr. McBerty present?

A. Yes, sir.

X-Q. 73. And you went over the affidavit with him?

A. Yes, sir.

X-Q. 74. Did you in that affidavit, if you recollect, refer to seeing these spot-welded blades and spiders after they were welded?

A. I could not say.

X-Q. 75. Why didn't you put that in?

A. I was called rather hasty over there to talk with these gentlemen, and it had been quite a while since I had seen any of this work, these things; after I got thinking it over, it came back to my mind.

X-Q. 76. Did Mr. McBerty at that time, that is, in 1913, suggest that perhaps you had seen some of these fan blades welded after they had been welded?

A. I don't remember as to that.

X-Q. 77. Is this your signature?

A. (Examining). Yes, sir, it looks——

X-Q. 79. Is this the affidavit that you gave to Mr. Howe in 1913?

A. Read it over. My eyes are on the bum.

X-Q. 80. I will read the entire affidavit: (Reading)

"In the United States District Court, District of Massachusetts.

In Equity, on Harmatta Patent No. 1,046,066.

Thomson Electric Welding Company, et al., vs. Barney & Berry, Incorporated.

Affidavit.

State of Ohio, County of Trumbull, ss.:

John S. Gilder, being duly sworn, deposes and says as follows:

My name is John S. Gilder. I am 38 years of age and reside in Warren, Ohio. I am at present employed by the Enterprise Electric Company at Warren, Ohio, as a transformer assembler.

Early in the year 1900 I came from the home of my parents in Kinsman, Ohio, and entered the employ of the Warren Electric & Specialty Co. in Warren, Ohio. This was in the early part of the year 1900, in January or February, because I remember that it was cold and wintry.

When I first entered the employ of the Warren Electric & Specialty Co. in 1900, the company was making its fan guards of brass. The rings of these guards at first had their ends secured together by inserting them in a sleeve and then securing them with solder.

Later it was the practice to dowel the ends of the rings together and then sweat them.

The next season, or the one after, that is, in the year 1901 or 1902, the manufacture of iron fan guards was begun by the company. At first they tried brazing the ends of the iron rings for the guards together, but that was not satisfactory, and the welding of the iron guard rings by electricity was begun.

This electric welding was started either the same season that the use of iron fan guards was begun, that is, in 1901 or 1902, or it may have been the next season after that. I have given these dates entirely from recollection and have no papers or memoranda by which I can verify them.

I recall in a general way seeing the electric welding machine which was used for welding the iron fan guards at the time I have mentioned. I recall this machine in a general way, but could not go into details regarding it. I recall that there were two short handles for pushing the clamp jaws together to secure the work in them, and there were two larger handles for pushing the clamps toward each other to bring the stock together to weld it. My work at the time was that of general utility man. I helped form the pieces for the guards in the shop and sometimes would assist in the welding. The only kind of welding which I remember seeing done on the machine at that time was the welding together of the ends of the stock to make fan guard rings. It was only occasionally, however that I was in a position to know what kind of work was being done on the machine, so that other kinds of work and characters of welds may have been made which I knew nothing about.

I have, on October 7th, 1913, examined a welding machine at the works of the National Electric Welder Co. at Warren, Ohio, and while I did not have sufficient to do with the ma-

chine so that all details were impressed on my mind, this appears to be the same machine that I saw used at the factory of the Warren Electric & Specialty Co. for welding the rings of iron guards as I have described.

(Signed) JOHN S. GILDER.

Subscribed and sworn to before me this 10th day of October, A. D. 1913.

(Signed) C. E. STEPHENS,
Notary Public.

(Seal) Notarial Seal. Trumbull County, Ohio."

Is that your affidavit?

A. Yes, sir.

X-Q. 81. Do you remember of signing and swearing to it before Mr. Stephens, a notary public?

A. Yes, sir.

X-Q. 82. At Warren?

A. Yes, sir, when he came over to the office of the Enterprise Electric Company, where I was working.

X-Q. 83. Do you remember who wrote out this affidavit?

A. I don't.

X-Q. 84. You were not present when it was being written out?

A. I don't believe I was, for they told me I could go back at my work.

X-Q. 85. The affidavit is true?

A. True, except as to age. That was six years ago: I was 40 years old; I believe I made a mistake in stating my age to Mr. McBerty.

X-Q. 86. In this affidavit the age was filled in with——

A. I think Mr. Stephens did that when I swore to the affidavit.

X-Q. 87. And this affidavit contains everything you remembered at that time?

A. At that time, yes, sir.

(Mr. Stackpole: Plaintiff offers in evidence as Plaintiff's Exhibit No. 29, as part of the cross-examination of Mr. Gilder.)

McELRAY.

McELRAY, after being duly sworn on behalf of the defendant, testified as follows:

Examined by MR. PATTISON:

Question 1. Where do you live?

Answer. Youngstown, Ohio.

Q. 2. What is your present occupation?

A. Assistant chief superintendent of the Carnegie Steel Company, Youngstown, Ohio.

Q. 3. Are you acquainted with a Mr. Smith, known as Captain Smith?

A. Yes, sir.

Q. 4. When did you first meet him?

A. January, 1905.

Q. 5. Where?

A. At the works of the Carnegie Steel Company.

Q. 6. What was Mr. Smith doing there?

A. He was employed as one of the shop men.

Q. 7. In connection with electric work?

A. In connection with electric repair work.

Q. 8. Mr. Smith has testified in this case while at the Carnegie Steel Works he built an electric welding machine. Do you know anything about that?

A. Yes, he did.

Q. 9. Did you have anything to do with it?

A. Yes, I helped him to build it.

Q. 10. What is your recollection of the construction of that machine?

A. You mean——

Q. 11. The welding machine.

A. You mean the description?

Q. 12. Of the machine—its construction.

A. Well, we used what we could find around the shop to build it with, and finally of the Westinghouse type of transformer. We used the iron that we made the primary coils of, and would be made the same shape as the Westinghouse coils would be made to fit the iron. The secondary was wound with heavy copper strip. In making the primary we used it so that we could use it for standard stuff that we worked on, and we used one-thirty-second seven-eighths copper wire, and the bulk of it would be copper terminals, seven-eighths inch, three inches wide.

Q. 13. What led to the making of this machine?

A. Curiosity, as far as I had anything to do with it. When Mr. Smith came to work for us, we were, or at least I was, new in the electric game, and hadn't had the opportunity of seeing very much electric apparatus, only what we had in our work, and at lunch time we would talk the different things over, and what the transitory workers had seen, and in the conversation Mr. Smith told us about electric welding and electric welding machines, and we asked him if he could make one, and he said he could, and I think I was one of the men that brought it up before the chief electrician, and the chief electrician gave us permission to go ahead.

Q. 14. What made Mr. Smith say he could build an electric welding machine?

A. He told us he had used one at the Warren plant where he worked.

Q. 15. Did he say where he used one?

A. I am under the impression it was at the Peerless Electric

Company's plant.

Q. 16. I show you a blueprint and ask you whether that represents in a general way the machine Mr. Smith made at the Carnegie Works?

A. Yes, sir, I would say that would be. I could probably make a drawing of it from memory if it was put to me to do.

(Mr. Pattison: The blueprint shown the witness is offered as Defendant's Exhibit G, Smith Welder.)

Q. 17. What kind of work was this welding machine used for at the Carnegie Works?

A. The real object of the machine was to eliminate a lot of hard work and poor work that we were doing on the construction of coils, and brake stops on motors. We were very economical in those days, and when the wires would burn in two, we would splice them; sometimes by wrapping wire around, and sometimes by making a sleeve, and when we made a sleeve, we butted them and when we wrapped them, we lapped them. In making a joint, we tried to make it come at the end of the coil, because if it came in the middle it might break, and sometimes in going over the bend of the coil it would break, and made a very poor job at times, and it was an inconvenient thing to handle, and Mr. Smith told us about this welding machine, and that was the thing that eliminated that trouble, and would be of the greatest convenience to us if we could get something to weld copper wires together. When we had a machine built, we found it was not big enough, had not the capacity to do that work. We tried it, and tried it very diligently at that time.

Q. 18. You mean it hadn't the capacity to weld copper wires together?

A. Yes, sir.

Q. 19. Was any welding done with it at all?

A. Yes, we had another job that cost us a lot of inconvenience, and that was making bolts or headers. We used No. 13 bolts to tie the different of resistance together. The bolts could not be bought at that time, 13 inches long, so we had to make it from a three-eighths iron rod. And it was a very long job, threading a round the steel, and not very successful all the time, so when we got this welder made, we conceived the idea of buying seven-eighths bolts and cutting the heads off and putting them on this machine to butt weld them, and we did it successfully.

Q. 20. Do you remember any tests made of butt welds to ascertain strength?

A. Yes, sir. When we had these made, we told our blacksmith at that time what we were going to do, and he was very skeptical; he said it could not be done. So we told him how we were going to do it, and he was on the job to see us do it, and he made the test of its strength; he put it in a vise himself and bent it back and forth,

until it broke, and it broke, as I remember it, half an inch away from the weld.

Q. 21. Was this machine used to weld any other things?

A. Yes, sir. Another thing we did at our work was to make pressed ribbon resistance, we called it P. R., as it was named at that time. After we had this machine going, doing butt welding, Mr. Smith conceived the idea to spot weld those ribbons, and we did that very successfully for some time. In fact, we continued to do it until we began to discontinue the use of P. R. resistance for a different type of resistance.

Q. 22. Did that spot type of welding go into commercial use?

A. Yes, sir.

Q. 23. When did it first go into commercial use?

A. Immediately after we made the weld.

Q. 24. When was that?

A. That was in 1905.

Q. 25. Will you state whether it was the early or latter part of the year 1905?

A. I would say we had the machine finished, built, before Mr. Smith had been with us six months.

Q. 26. When did he come there?

A. In January, 1905.

Q. 27. Can you produce an illustrative sample of this spot welding that was done?

A. Yes, I can (producing).

Q. 28. Is this a fair illustration of the spot welding that was done on the Smith machine?

A. I would say it was a far nicer looking job from a mechanical standpoint.

X-Q. 29. When was this made?

A. That was done this morning.

Q. 30. And this is the kind of work that went into commercial use, as you stated?

A. Yes, sir, that is the exact size of the ribbon we used, and still continue to use it for other purposes in our work.

Q. 31. What was the resistance?

A. The resistance used in starting that type of motor is the same resistance that was used practically on most street cars at that time, in starting motors of any type.

Q. 32. Did you find this spot welding successfully performed that season?

A. I never found one that had given us any trouble by burning open.

Q. 33. And had the ribbon given you any trouble before?

A. Continual trouble, yes, sir.

Q. 34. Is this Smith machine in existence now?

A. It is not.

Q. 35. When was the last time you saw it?

A. It was really destroyed at the time of the flood that we had in that section of the country, and it laid in our shop cellar until we went to clean house, you might say, and we looked at the machine, and debated over it, and decided to scrap it. We have been sorry many times since that we did it. We still can find practical uses for it now more than we could at that time.

(Mr. Fish: When was that large one made?)

(The Court: Six years ago in March.)

(Mr. Pattison: Sample offered as Defendant's Exhibit 71, Illustrative Work Done on Smith Electric Welder.)

Q. 36. That is all.

Cross-examination by MR. SRACKFOLE:

X-Q. 37. On what kind of machine was this model made this morning?

A. On a Winfield machine.

X-Q. 38. In Detroit?

A. Yes, sir.

X-Q. 39. In what factory?

A. The—I had never seen the plant before. I don't know the exact name.

X-Q. 40. This Smith machine was originally intended for butt welding copper rods, and it failed on that?

A. On welding copper wire, yes, it failed on that.

X-Q. 41. And then it was used to butt weld the ends of these two bolts?

A. Yes, sir.

X-Q. 42. Was that successful?

A. Very successful.

X-Q. 43. And later, it was used to spot weld the ends of these iron ribbons? Is that the idea?

A. Yes, sir.

X-Q. 44. How much later was it used for the butt welding of ends of the bolts?

A. I would say at the same time, we were doing the same work all the time. I would not say which was done first, but if my memory serves me right, the bolts were butt welded first, more for curiosity through the mechanical department; our blacksmith doubted our ability to do it.

X-Q. 45. The bolts were spot welded first?

A. I could not remember that. I think so, but I cannot remember distinctly.

X-Q. 46. That was a good many years ago?

A. That was in 1905.

FRED G. CARTER.

FRED G. CARTER, after being duly sworn on behalf of the defendant, testified as follows:

Examined by MR. PATTISON:

Question 1. Where are you now living, Mr. Carter?
Answer. Warren, Ohio.
Q. 2. What is your business?
A. Machinist.
Q. 3. Where are you now working?
A. The Trumbull Steel Company, Warren, Ohio.
Q. 4. Did you ever work for the Winfield Manufacturing Company?
A. I did, sir.
Q. 5. Did you know Mr. Albert Taylor?
A. I knew Mr. Bert Taylor.
Q. 6. Was he at the Winfield Company while you were there?
A. Yes, sir, he was.
Q. 7. Do you know anything about any welding machine he had made?
A. Yes, sir, I had some experience on the welding machine Mr. Taylor made.
Q. 8. When was this?
A. As near as I can recollect, it was the year 1905.
Q. 9. When did you go with the Winfield Company?
A. I first went with the Winfield Company in 1904, the summer.
Q. 10. The summer of 1904?
A. Yes, sir.
Q. 11. What was the first work you remember of on the welding machine at the Winfield Company?
A. The first work I can remember was butt welding.
Q. 12. Does this drawing illustrate anything you saw at that time? (referring to Defendant's Exhibit 69).
A. There is a drawing on this sheet that well represents the first machine I did work on.
Q. 13. What kind of work was done on this machine?
A. The work done on this machine was butt welding the parts of elbows, bent elbows, one-piece elbow.
Q. 14. Was any other kind of work done on this machine?
A. Yes, sir; there was quite a bit of experimental work done on that machine.
Q. 15. What did that relate to?
A. It related to spot welds and the spot welding and butt welding.
Q. 16. On what?
A. On a butt welding machine.
Q. 17. What did you weld?
A. Small strips of sheet steel, as near as I can recollect.

Q. 18. Did you do any work on the machine referred to on this sketch?

A. Yes, sir.

Q. 19. What work did you do on this machine?

A. As near as I can recollect, I made the handle that operates the sliding head on this machine.

Q. 20. Did you operate it?

A. I have operated that machine.

Q. 21. What kind of welds did you make on it?

A. I made butt welds, and I have made spot welds on it.

Q. 22. What did you spot weld?

A. Small pieces of steel parts of elbows.

Q. 23. Did you ever see that machine before you?

A. Yes, sir, I have seen that machine.

Q. 24. Where did you see it?

A. At the plant of the Winfield Manufacturing Company at Warren, Ohio.

Q. 25. Did you see it operated?

A. I did.

Q. 26. This Exhibit 68, did you operate it?

A. I recall I did operate that machine then in an experimental way.

Q. 27. What did you do on that machine?

A. I have welded small pieces of steel, parts of elbows, in an experimental way.

Q. 28. Did it weld good?

A. It certainly did.

Q. 29. Do you know whether Mr. Taylor did any further work on electric welding machines at the Winfield Company?

A. I know that Mr. Taylor continued in that line of work.

Q. 30. When did you leave the Winfield plant?

A. To the best of my recollection, it was 1907. I am not positive.

Q. 31. Were you closely connected with the electric welder work all the time you were there?

A. I was.

Q. 32. In what way?

A. Being a machinist, I had considerable to do with the different machines made, and so forth.

Q. 33. What character of machine followed this Exhibit 68?

A. I would say the spot welder.

Q. 34. What was the general construction of it?

A. The general construction of the spot welder we completed was like this machine, I would say a six-inch machine, and there has been very little improvement, with the exception of the base it stood on and the operating switch.

Q. 35. I hand you a sketch and will ask you whether that represented the machine according to your recollection?

A. To the best of my recollection, that is the exact duplicate.

Q. 36. What was done with that machine?
A. I think that machine was put on the market. I am not positive. There was some work done with it in the shop.
Q. 37. The exhibit referred to is Defendant's Exhibit 70. Were other machines than the one like this Exhibit 70 built there?
A. There were.
Q. 38. Did you do any work on them?
A. I did.
Q. 39. Were any machines offered for sale while you were there?
A. Yes, sir, there were.
Q. 40. Were any sold while you were there?
A. To the best of my knowledge; they left the shop.
Q. 41. When you left there in 1907, were they still engaged in the manufacture of spot welders?
A. They were.
Q. 42. Do you know whether the Winfield Company used spot welders in the manufacture of their product?
A. They did at one time.
Q. 43. What did they use it for?
A. Welding seams and elbows.
Q. 44. "At one time." When was that?
A. That was the year 1906, I will say. I am not positive of that. It may have been before that.
Q. 45. Did any of this spot welding work go out to the trade?
A. Yes, sir.
Q. 46. What were the articles that were welded?
A. Stove-pipe elbows.
Q. 47. Did you see many of them manufactured for the market?
A. I did, quite a few.
Q. 48. In 1906?
A. Yes, sir.
Q. 49. Do you think it was not earlier than that?
A. It might have been earlier, possibly.
Q. 50. Then you were closely connected with Mr. Taylor's work?
A. I was.
Q. 51. Did he tell you where he first learned about welders?
A. No, sir, not to my recollection.

(Mr. Pattison: That is all.)

No cross-examination.

(The Court: Call the next witness.)

(Mr. Church: There is a witness on his way here.)

(The Court: We have at least an hour left.)

(Mr. Church: May I ask we take a recess for a few minutes?)

(The Court: Yes. I would like to get out of the building by at least 25 minutes to four.)

EVRAH C. LIPPS.

EVRAH C. LIPPS, after being duly sworn on behalf of the defendant, testified as follows:

Direct examination by MR. PATTISON:

Question 1. Your full name?
Answer. Evrah C. Lipps.
Q. 2. Where do you live?
A. Ninety-eight and one-half Moran Street, Detroit.
Q. 3. Where are you now working?
A. At the Packard Motor Car Company.
Q. 4. What are your duties there?
A. Foreman in the tool room.
Q. 5. How long have you been with them?
A. Nine years the fourth of last April.
Q. 6. Do you know Mr. Fred P. McBerty of Warren, Ohio?
A. Yes, sir.
Q. 7. When did you meet him?
A. In 1900. I don't know just exactly when first. I believe it was the year 1900 that I first saw him, as near as I can recollect.
Q. 8. Did you work at the Warren Electric & Specialty Company at any time?
A. Yes, sir.
Q. 9. When did you leave the employment of that company?
A. In 1901.
Q. 10. What time in 1901?
A. In June.
Q. 11. While you were working for the Warren Electric & Specialty Company, did you see an electric welder there?
A. Yes, sir.
Q. 12. Did you do any work on it?
A. Yes, sir. That is, it wasn't my duty to do the operating of it, but I saw the machine there all the time.
Q. 13. Did you do any welding on it?
A. I have occasionally, yes, sir, but not as a regular business.
Q. 14. What kind of welding did you do on it?
A. Butt welding, welding rings together.
Q. 15. Did you do any other kind of welding on it?
A. I cannot remember what welding was done on it, but there was other welding besides the butt welding. I know we welded fan blades.

Q. 16. What were they welded to?
A. To the center member.
Q. 17. Did you see any of these fan blades welded to the center members?
A. I don't recollect of seeing the fan blades themselves welded, but I saw them after they were welded.
Q. 18. You didn't see the work done, but you saw the fan blades after they were finished?
A. I saw the boys working on them. It has been so long ago I never paid any attention to it any more than that.
Q. 19. This was, of course, before you left there in June, 1901?
A. Yes, sir.
Q. 20. Do you think you could recognize that welder machine?
A. I think I would.
Q. 21. Examine this machine over here and see what you think it is.
A. Yes, sir, that is the machine.
Q. 22. Where did you see it?
A. The first time I saw it was at the Warren Electric & Specialty Company's factory.
Q. 23. That was before you left there in June, 1901?
A. Yes, sir.
Q. 24. Did you see any completed fan blades that were welded on this machine?
A. You mean on the fans, or do you mean——
Q. 25. I mean the four parts.
A. Yes, sir.
Q. 26. Did you see any put on the completed fan?
A. I saw them working on them. They would make a piece, the cross bars, and weld them on afterwards.

(By the Court):

Q. 27. You have no recollection of seeing any completed fans?
A. Oh, yes.
Q. 28. With the welds on? You have seen the assembled fans?
A. Not the assembled fans, but the four blades on.
Q. 29. The four blades on them?
A. Yes, sir.

(By Mr. Pattison):

Q. 30. I show you a sketch and ask you if you have seen that before?
A. Yes, sir. I believe, as nearly as I can see, that is the original sketch that machine was made after.

(The Court: Did you ever see the sketch before?)

(The Witness: Yes, sir, I saw the sketch itself.)

Q. 31. At the Warren factory?
A. Yes, sir.

(Mr. Pattison: This is the sketch, Exhibit M, attached to McBerty's affidavit, Exhibit 28.)

Q. 32. How did you happen to see that sketch at the Warrer Electric & Specialty Company's place?

A. Well, now, it was in the process of construction. I saw what was going on, the different machines, and Mr. McBerty would show us different methods and maybe make a sketch, and take them in the machine shop to have them worked up, and in my duty I would be from one place to another, and would naturally see them. I worked there some time, and saw a great many of the parts, and worked on them. It is so long ago it is now a hard matter to recollect the actual process of putting those parts together, and what I did make myself, and what I assembled, so long ago.

Q. 33. Did you, as a matter of fact, make any of the parts of that machine?

A. I assisted in making them, yes, sir.

Q. 34. Whom did you assist in making them?

A. Let me see—Mr. McBerty himself was one, and I think Mr. McDonald—no, it wasn't Mr. McDonald.

Q. 35. Maybe you can remember some of the gentlemen here in the room. Do you remember Mr. Powers of the Warren Electric & Specialty Company?

A. John Powers, yes, sir.

Q. 36. Jasper Powers?

A. Jasper Powers, yes, sir.

Q. 37. Did he help about this machine?

A. He was the man; I could not think of his name. I was trying to recall him. He was the foreman of the machine shop.

Q. 38. How many of these completed fan blades do you think you saw spot welded?

A. I could not tell you how many. I know we saw some. It was common talk in the shop, making them that way.

Q. 39. You left that company in June, 1901?

A. Yes, sir.

(Mr. Pattison: That is all.)

Cross-examination by MR. STACKPOLE:

X-Q. 40. Are you sure it is 1901 that you left the employ of that company?

A. Why, as near as I can recollect, it was.

X-Q. 41. Wasn't it 1900?

A. No, I think it was June. You see, I had a contract. In fact, I have that contract at my house, and when that expired, I left the employ and went into business for myself in Cleveland.

X-Q. 42. And was not that 1900?

A. If Mr. McBerty has my time book here, where I kept the dates of the men working there, I could tell. That would show the exact time.

X-Q. 43. Well, after you went to Cleveland, did you go back to Warren?

A. Yes, sir.

X-Q. 44. Into whose employ did you enter there?

A. From Cleveland I came back and went in with the Trumbull Manufacturing Company for about a month, awaiting an opening to come back into the old plant.

X-Q. 45. And did you finally go back into the old plant?

A. Yes, sir.

X-Q. 46. What year was that, if you remember.

A. Nineteen hundred and two, I think.

X-Q. 47. Nineteen hundred and two?

A. Yes, sir. I was away just a year. I left Warren in 1901 and I came back in September, 1902.

X-Q. 48. Do you recall a visit made to you by a Mr. Howe, and a Mr. McBerty in 1913, and the making of an adffiavit at that time?

A. Yes, sir.

X-Q. 49. And telling them all you knew about this matter of the spot welder?

A. Yes, sir.

X-Q. 50. You told him everything you knew then?

A. I told them all I could recollect at that time, yes, sir.

X-Q. 51. Did you give them any specimens or exhibits or anything else at that time?

A. They had all the exhibits that were available.

X-Q. 52. Did you make an affidavit?

A. Yes, sir.

X-Q. 53. Would you recognize that if you saw it now?

A. I think I would.

X-Q. 54. Do you remember whether you said in that affidavit:

> "I left the employ of the Warren Electric & Specialty Company in the summer of 1900, and went to Cleveland, Ohio, where I engaged in the manufacture of electric fans on my account. Attached hereto is the time book (marked Exhibit 'G') which I kept during this work in Cleveland, in which time time spent is marked beginning on August 20th, 1900, and continuing until April 29th, 1901, when I discontinued my Cleveland enterprise and went back to Warren, Ohio. I at first went to work for the Trumbull Manufacturing Company, where I remained but a few weeks."

Do you recall that?

A. Yes, sir. To get the exact date is a difficult matter, unless you

have something to refer to. That is the reason I fix that, was to have my old time book, and having given that up, I have no diary or notes or kept anything of that kind, that I could tell from, so I couldn't tell.

X-Q. 55 (Showing book). Is this your time book?

A. Yes, sir.

X-Q. 56. Does that help you in fixing the year?

A. Yes, I am in error. Has this been altered in any way?

X-Q. 57. Not that I know of.

A. This is 1900.

X-Q. Yes, I think you made a mistake in your testimony.

A. That is what I told you. It has been so long ago that all I could recollect from is previous data.

(Mr. Stackpole: I think we might save time if I simply put the affidavit in and asked him if he made the affidavit, and what is in it, and we can read it later.

(The Witness: I was under the impression it was 1901.)

(The Court: This is your time book?)

(The Witness: Yes, sir, the book I had when I was doing some experimental work in Cleveland. I was building a new fan entirely. This was just a time book I kept there with the dates on, and it happened I laid that aside. and I were working together, and we kept a record of each day of the work each of us were on. That is the way I fix the date in my mind.)

X-Q. 59. I show you an affidavit entitled: "In the United States District Court, District of Massachusetts. Thomson Electric Welding Company, et al., vs. Barney & Berry, Incorporated." Is that your signature to that affidavit?

A. Yes, sir.

X-Q. 60. Did you swear to that affidavit in October, 1913, as shown by that jurat?

A. I don't know what date it was, sir.

(Mr. Stackpole: That book goes in with the affidavit, does it not?)

(Mr. Church: Yes.)

X-Q. 61. Will you look that affidavit over and see if you recognize that as your affidavit made at that time?

A. I have had no occasion to remember that. I had nothing to refresh my mind on, and it is hard to accurately remember the dates. Let me read this. This was made when I had my copies of everything so that I could refer to it, and as I stated before,

when I go to remember these things, it is a very difficult matter to place dates. 1898, you see, is when I started to work with them. It was 1899, I think it was, the year after he came back to work there. He was not there when I first came there, when I first came to the Warren Electric Company, McBerty was not there. Then he came in afterwards. It is a hard matter to remember that. It was just a short time afterwards. Then you have a copy of my original contract?

X-Q. 62. It is attached thereto. You may look at it and see.

A. I would look at it to fix the date. The date of that contract would show the exact date.

(Mr. Fish: Let me find it for you. That is the contract there. The matter of dates is not of large consequence. I have no doubt the dates in your affidavit are right.)

A. By carrying this book, carrying one date after another, I could tell. I was with them there two years. That would be 1900. I was with them at that time experimenting. 1898, March 2nd, that is right, because I came there—well, I came there on the 25th of January, and this contract was made out the 2nd subsequent to the 25th of January.

(Mr. Stackpole: The dates are not of so much importance as whether you recognize that affidavit as the one you signed.)

A. I don't recollect that part of it being in there. That is right. You see, everybody was working with that machine.

X-Q. 63. Is this your affidavit? That is the question.

A. Yes, sir; yes, sir.

(The Court: That is all we want to know, whether that is your affidavit or not.)

A. Yes, sir.

X-Q. 64. You gave the information contained in that affidavit to Mr. Howe in Mr. McBerty's presence?

A. Yes, sir.

X-Q. 65. In that affidavit do you recollect giving him this information:

"When I was working with the Trumbull Company in 1901, as I have referred to, I frequently went to the works of the Warren Electric & Specialty Company to see Mr. Fred P. McBerty, with whom I was very friendly, and during these visits I saw an electric welding machine which was arranged as shown in the sketch given to Mr. McBerty last December and in the Exhibit 'A' attached to Brown's affidavit above referred to. At the time of my visit to Mr. McBerty in 1901 this

machine was used for butt-welding the rings of fan guards and I recall distinctly that on one of my visits I found Mr. McBerty changing the transformer which supplied current to the machine. The reason for this being that the transformer which had been used was not of large enough capacity to supply the current for welding the inner fan rings, so that the transformer became over-heated and the change consisted in putting in a transformer of large capacity so that sufficient current could be supplied"?

Is that correct?

A. He was putting in a new transformer, yes, sir.

X-Q. 66. The question is whether that statement there is correct. Is that statement correct as I read that?

A. As nearly as I could judge from it, yes, sir.

X-Q. 67. Do you recollect this sample attached to the affidavit?

A. I could not recall that. It looks very much like it. We had so many of those pieces laying around there, whether that is one or not, I could not say. It looks very much like it. In fact, I would say that it was, as near as I could judge, because the way they make the welds now is by bringing a heavier pressure on them, and they are dented in more.

X-Q. 68. Do you recall in that machine, in the case of the spot welded blades, that the blades were punched for rivet holes?

A. Originally, we riveted all of them.

X-Q. 69. And the blades were punched for rivet holes?

A. Yes, sir.

X-Q. 70. And in the four-bladed welded device, were they similar in character and size to Defendant's Exhibit H that you saw?

A. Very similar to that. It worked on that same principle exactly.

X-Q. 71. Now do you recall that the spot welding was not adopted as a commercial method of making those blades by the Warren Electric Company in 1901?

A. Yes, sir.

X-Q. 72. Do you know the reason why?

A. I could not tell you any more than it was a new thing, and they were a little skeptical about going into anything they were not thoroughly familiar with.

X-Q. 73. Do you recall the use of electrodes that were bent up in that machine?

A. Bent up in what way?

X-Q. 74. Put in the—well, I don't know. I will read what you say:

"I distinctly remember that at that time the space between the clamp arms 3 and 4 was not sufficiently deep to permit the sheets, to be welded together, to extend sufficiently low-

down when placed between the electrodes 31 and 32 when these electrodes were straight, and so we bent the ends of these electrodes upwardly so as to allow the sheets of metal to enter between the electrodes to a sufficient extent to place the weld at the spot desired."

That was done?

A. Yes, sir.

X-Q. 75. You recall that?

A. Yes, sir. You will notice that machine set on a different base from what you have got it attached there to now. It was on a bench.

X-Q. 76. Did it stick out as far as it does now?

A. It had been altered repeatedly. When first made, it set down.

X-Q. 77. Covered the whole bench?

A. Yes, sir.

X-Q. 78. Didn't stick out at all?

A. It didn't stick out at all first.

X-Q. 79. Later, you say it was moved out?

A. Yes, sir.

X-Q. 80. Do you recall in the original machine the fibre between the two base plates ran the whole length?

A. Yes, sir. That is why we could not get a sheet in between.

X-Q. 81. Did you tell Mr. Howe at that time that you had seen complete four-bladed welded spiders?

A. Very similar to that.

X-Q. 82. Did you tell Mr. Howe that?

A. I think I did, yes, sir.

X-Q. 83. Did you tell him you saw this going through the factory?

A. They were not going through the commercial part of it, no.

X-Q. 84. They were not?

A. No.

X-Q. 85. Just experimental?

A. Just experimental, yes, sir.

(Mr. Stackpole: We offer in evidence Mr. Lipps' affidavit as Plaintiff's Exhibit 30. I would like to have the Clerk mark this at once.)

(The Court: Yes, bring the clerk in to have them marked.)

(Mr. Stackpole: We would like these two marked, because they are important. I put the number up in the corner, and this should be attached.)

X-Q. 86. Do you recognize the exhibits attached to this affidavit, the contract between yourself and the Warren Electric & Specialty Company, and the other exhibits?

A. That was where we started our dating.
X-Q. 87. You recognize that exhibit?
A. Yes, sir.
X-Q. 88. Do you recognize that telegram that follows after that?
A. Yes, sir. I was down in West Virginia.
X-Q. 89. Do you recognize the next exhibit, another telegram?
A. Yes, sir.
X-Q. 90. Do you recognize the next one, which is a drawing?
A. That is one of them; that is the original.
X-Q. 91. That is the original, is it?
A. I think so. Mr. Powers——
X-Q. 92. When was that made?
A. Well, it was made before I went to Cleveland.

(The Court: Here is the Clerk. Now, Mr. Voorheis, there are several exhibits counsel want you to initial and mark at once. You may look at their original affidavits and at the same time you may include Defendant's Exhibit M, and give it particular care. I suggest you mark those exhibits and put them all in one package.)

(Clerk Voorheis: I will care for them. They will all go in one locker together. They will be under lock.)

X-Q. 93. This exhibit is correct in its statement of fact?
A. As near as I can remember. I have not read it all. As near as I could remember at that time. It was brought up to date, those other occurrences, so that I could bring one following the other. So that I knew at that time, but perhaps not so clearly now.
X-Q. 94. I would like to have your present recollection, whether you think that affidavit is correct?
A. I think it is correct, yes, sir.
X-Q. 95. That is all.

(The Court: Any re-examination?)

Redirect examination by MR. PATTISON:

Re-D. Q. 96. Do you know Mr. E. B. Craft?
A. I knew him, yes, sir.
Re-D. Q. 97. Was he at the Warren Electric & Specialty Company while you were there?
A. He was there, yes, sir.
Re-D. Q. 98. You were working at the same time he was?
A. Yes, sir.

(Mr. Pattison: That is all.)

(Mr. Stackpole: That is all, your Honor.)

(Mr. Church: That is all we have at this time.)

(The Court: I have about 17 minutes at your service.)

(Mr. Stackpole: It will not be worth while to enter upon anything further at this time.)

UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF MICHIGAN

SOUTHERN DIVISION.

THOMSON SPOT WELDER COMPANY, Plaintiff.

vs.

FORD MOTOR COMPANY, Defendant.

In Equity. On Harmatta Patent No. 1,046,066.

Deposition of Francis S. Maguire, taken in behalf of the defendant, at the office of Messrs. Church & Church, 604 McGill Building, Washington, D. C., on the 28th day of May, 1919, before Thomas Durant, a notary public in and for the District of Columbia, pursuant to notice.

Present: Melville Church, Esq., in behalf of Defendant. H. M. Holmes, Esq., in behalf of Plaintiff.

FRANCIS S. MAGUIRE.

FRANCIS S. MAGUIRE, a witness produced in behalf of defendant, having been duly sworn, deposes and says, in answer to questions propounded to him by Mr. Church, counsel for the defendant, as follows:

Question 1. Please state your name, age, residence and occupation.

Answer. Francis S. Maguire; age, 37; Washington, D. C.; patent lawyer.

Q. 2. How long have you been engaged in the patent law business?

A. For the past fifteen years.

Q. 3. And how long have you been a member of the Bar?

A. Since 1904.

Q. 4. You were formerly associated in business with the late

J. Nota McGill, Esq., of this city, were you not?

A. I was.

Q. 5. During what period were you so associated with him?

A. From about 1899 through 1915.

Q. 6. When did Mr. McGill die?

A. October 16, 1915.

Q. 7. On his death, who succeeded to his business and became the custodian of his papers and files?

A. The firm of McGill & Maguire, of which I am a member.

Q. 8. What is your partner's name?

A. Grafton L. McGill.

Q. 9. And what relation did he bear to J. Nota McGill?

A. He was a brother of the late J. Nota McGill?

Q. 10. Please examine the paper I now show you and state, if you know, what it is and where it came from?

A. It is a letter from the National Electric Welder Company, dated April 20, 1914, addressed to J. Nota McGill, and produced from the files of McGill & Maguire.

Q. 11. How is that letter subscribed?

A. The National Elec. Welder Co., per F. P. McBerty, Sec. & Treas.

Q. 12. Are you familiar with the signature of F. P. McBerty, who appears to have signed this letter as secretary and treasurer of the National Electric Welder Co., and if so state whether or not you recognize the written signature forming part of this subscription as his?

A. I am familiar with the signature of Mr. F. P. McBerty, who signed this letter as secretary and treasurer and I recognize the signature as that of Mr. McBerty.

(Mr. Holmes: This question and answer are objected to as immaterial and irrelevant and as intended to prove a document by improper methods and by secondary evidence, no proof having been offered as to why this document cannot be proved by first hand evidence of the writer.)

Q. 13. I note on the face of this letter in the upper left hand corner, the following notation in pencil "4/22/14." State, if you know, what that indicates, and who made it?

(Mr. Holmes: Same objection.)

A. The notation is in the handwriting of the late J. Nota McGill and indicates the date of the reply to the letter of the National Electric Welder Company, it having been the custom of the office of the late J. Nota McGill to note the date of a reply to all letters in the upper left hand corner of the letters.

Q. 14. State whether or not you are familiar with the handwriting of the late J. Nota McGill?

A. I am.

(Mr. Church: The letter is offered in evidence as "Defendant's Exhibit No. 72, McBerty letter of April 20, 1914.

(Mr. Holmes: Introduction of this letter in evidence is objected to first, as the introduction of heresay testimony, secondly, as improperly proven. No basis has been made for proving this letter by secondary evidence and no opportunity given to plaintiff to cross-examine the writer of the letter on the contents thereof. The letter is immaterial, irrelevant and entirely improper and counsel for defendant is notified that a motion will be made in due course to strike the same from the record.

Q. 15. Please examine this second paper which I now show you and state if you know what it is and where it came from?

A. This is a letter from the National Electric Welder Company, dated February 1, 1913, addressed to J. Nota McGill and produced from the files of my firm, McGill & Maguire.

(Mr. Holmes: This question and answer are objected to for the reasons already stated in reference to the questions and answer as to the first letter introduced in evidence, and the objection is repeated to all further questions in reference to said letter.

Q. 16. How is this letter subscribed?

A. The National Elec. Welder Co., by Z. A. McBerty, Assistant Sec'y.

Q. 17. Who is Z. A. McBerty, if you know?

A. Z. A. McBerty is the wife of Mr. F. P. McBerty.

Q. 18. Are you familiar with the signature of Z. A. McBerty, who signed this letter as assistant secretary of the National Electric Welder Co., and if so state whether or not you recognize the written signature forming a part of this subscription as hers?

A. I am familiar with the signature of Z. A. McBerty and recognize that subscribed to the letter as her signature.

Q. 19. I notice on this letter at the upper left hand corner the notation "2/3/13." In whose handwriting is that and what does it indicate?

A. The notation is in the handwriting of the late J. Nota McGill and indicates the date of the reply to the letter upon which it appears, namely, February 3, 1913.

Q. 20. I believe you did not say what the notation "4/22/14" on Defendant's Exhibit No. 72 means. Will you please state what it means?

A. The numerals "4/22/14" on Defendant's Exhibit No. 72, indicate April 22, 1914.

Q. 21. The letter of February 1st, 1913, is offered in evidence as "Defendant's Exhibit No. 73, McBerty letter of February 1, 1913."

(Mr. Holmes: Plaintiff objects to the introduction of this letter in evidence for the reasons stated above in the objection to the first letter introduced in evidence at this hearing and notice is repeated that a motion will be made in due course to strike this letter from the evidence.)

Q. 22. Are we to understand that these two letters—Defendant's Exhibit No. 72 and Defendant's Exhibit No. 73—are produced by you from the files of the late J. Nota McGill which came into the possession of your firm as the successor to his business?

A. That is correct?

Q. 23. State whether or not you are able to say whether the notation "4/22/14" on the upper left hand corner of Defendant's Exhibit No. 72, and the notation "2/3/13" on the upper left hand corner of Defendant's Exhibit No. 73 were applied in due course of business and according to the common practice in the office of the late J. Nota McGill?

(Mr. Holmes: This question and the preceding question and all further questions with respect to these letters is objected to as immaterial and irrelevant, the letters not being properly in evidence.)

A. The notations "4/22/14" and "2/3/13," appearing upon the Exhibits Nos. 72 and 73 were applied in the due course of business and according to the common custom in the office of the late J. Nota McGill, no receiving stamp being used in the office to indicate the date of receipt, but the date of reply being always applied by pencil notation in the upper left hand corner.

Cross-examination by MR. HOLMES:

X-Q. 24. Have you in your office a file of Mr. McGill's correspondence including copies of letters which he himself wrote during the period of his practice?

A. We have nearly all of the files made up during the practice of the late J. Nota McGill, which include the letters addressed to Mr. McGill, and we have the letter books in which all letters written by Mr. McGill are letter pressed, with the possible exception of letters written in the earlier part of his practice and up to about 1895.

X-Q. 25. Will you please produce the letter press copy of the letter which Mr. McGill wrote to Mr. McBerty under date of April 22, 1914, in reply to the letter of April 20th, 1914, from Mr. McBerty, introduced in evidence as Defendant's Exhibit No. 72?

A. I have here our letter press book numbered 54 and wherein is a press copy of the letter from Mr. J. Nota McGill to the National Electric Welder Co., dated April 22, 1914.

It is stipulated that a copy of the letter may be read into the record from the letter book, the letter itself to be retained in the possession of Mr. Maguire.

The letter is as follows:

"22nd April, 1914.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I appreciate getting your letter of the 20th instant. There are many things which I do not understand as to the trial at Boston. Somebody got a case of weak knees or was it a case of cold feet? I cannot possibly understand the failure to lay foundation in the answer for your evidence. There is so much to consider that I prefer to defer saying anything more until I see Mr. McBerty, either here or in Warren.

I am today writing Mr. Edwards for information.

Very truly yours,

J. NOTA MCGILL.

M.I."

X-Q. 26. Will you please produce a copy of Mr. McGill's letter to Mr. Edwards and Mr. Edwards' reply thereto?

A. The copy of the letter from Mr. J. Nota McGill, dated April 22, 1914, to C. V. Edwards, Esq., is produced, being a press copy of the letter which is in our letter book No. 54, and Mr. Edwards' letter in reply, dated April 27, 1914, addressed to J. Nota McGill, Esq., is produced from our file.

The letter from Mr. McGill to Mr. Edwards follows.

"22nd April, 1914.

C. V. Edwards, Esq.,
No. 2 Rector Street,
New York.

Dear Mr. Edwards:

I hear that the testimony has been taken in open court in the suit on the Harmatta patent. What is the outlook? I also understand, in a general way, that McBerty's testimony was objected to for failure to lay foundation therefor in the answer. Is my understanding correct? I will appreciate any information you may give me.

Very truly yours,

J. NOTA MCGILL.

M.I."

Mr. Edwards' letter to Mr. McGill follows.

"EDWARDS, SAEGER & WOOSTER
Counsellors at Law
United States Express Building
2 Rector Street, New York

Clifton V. Edwards (4175)
Lawrence K. Sager Telephone (4176) Rector
Julian S. Wooster Cable Address
Edwayer New York.
April 27, 1914.

J. Nota McGill, Esq.,
McGill Building,
Washington, D. C.

Dear Sir:—

I have your letter of the 22nd. The taking of testimony in the suit on the Harmatta patent was completed and the case adjourned to be argued at a date to be fixed by the Court. This date has not been fixed. It is true that McBerty's testimany regarding earlier use was objected to and excluded upon the ground that such use was not set up in the answer. Mr. McBerty, however, gave very valuable testimony along other lines. It is, of course, impossible to form any accurate estimate of the outlook, but we have very strong hopes.

Yours very truly,
C. V. EDWARDS.

CVE.-G."

Indorsed on the upper left hand corner is the notation "4/30/14"

X-Q. 27. Will you please explain the notation "LB 50 page 911" on Defendant's Exhibit No. 73?

A. That has reference to letter book 50, page 911, wherein is pressed the reply to the letter of the National Electric Welder Co. of February 1, 1913.

X-Q. 28. Will you please produce a copy of that letter?

A. I produce letter book No. 50, where at page 911 is a letter from J. Nota McGill, dated February 3, 1913, to the National Electric Welder Co., reading as follows:

"3rd February, 1913.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I have your letter of the 1st instant and also the blade welded in 1901.

Mr. Fish advises me that he may be able to make an appointment for some day next week.

Very truly yours,
J. NOTA MCGILL."

X-Q. 29. I note on the letter press copy of this letter the notation in pencil "852." Will you please explain that notation?

A. The numerals in pencil "852" refer to the previous letter in letter book 50, addressed to The National Electric Welder Co., which is dated January 29, 1913.

X-Q. 30. The notation on each letter press copy of the page whereon is copied the previous letter written to the same person was the invariable practice in your office. Is that true?

A. That is correct.

X-Q. 31. Will you read into the record the letter of January 29, 1913?

A. The letter reads as follows:

"29th January, 1913.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I received your telegram yesterday, and in the next mail will doubtless have the Harmatta file.

I have asked Mr. Fish to designate some day next week when I may see him in New York.

Please send me one of the fan blades which was spot-welded in 1901 or thereabouts. I mean one of the two which Mr. McBerty showed me when last in Warren. Let him mark it in some way so that he can hereafter identify it when returned.

I am engaged in looking up the law on the question, and hope to report in a day or two.

Very truly yours,

J. NOTA MCGILL.

Later— I have your letter of the 28th instant and the Harmatta file wrapper.

I suggest that Mr. McBerty go to Cincinnati but pay his own expenses. Listen to what they have to say, but state that without consulting the other officers of the Company he is in no position to commit the National. After he learns what action is to be taken by the different parties he will confer with his associates and then advise them in the premises. Until his associates know what the others intend to do, and how they intend to take care of the National in the proposed deal, he is in no position to disclose the evidence upon which he may rely should suit be brought against us.

JNM

X-Q. 32. Will you please show me the letter from The National Electric Welder Co., under date of "the 28th instant" referred to by Mr. McGill in the letter of January 29, 1913?

A. I hand you the letter of January 28, 1913, from The National Electric Welder Co. to J. Nota McGill, reading as follows:

"Warren, Ohio January 28th,
1913,

J. Nota McGill,
Attorney At Law,
Washington, D. C.
Dear Sir:—

Your favor of the 27th inst., at hand, and are pleased to note Mr. Fish is sufficiently interested in your evidence to suggest a meeting. If possible we will be pleased to have you take the matter up with him Thursday.

We are forwarding by registered mail today, the file wrappers of the "Harmatta" case, but beg to advise this is a copy supplied us by the Winfield Co. Mr. Warren of The Toledo Elec. Welder Co., sent his copy to the Winfield Co., suggesting they make a copy for themselves and the National Co., which they did, but we would not want to guarantee the same as being a duplicate of the original.

We are enclosing herewith copy of a letter received from Mr. Warren, and are pleased to note that this company are deeply interested in preventing the National Co., from doing anything which might cause us future anguish.

Thanking you for past favors, and hoping the matter under consideration can be arranged to the satisfaction of all parties concerned, we are

Very respectfully yours,
THE NATIONAL ELEC. WELDER CO.
per
F. P. MCBERTY,
Sec'y and Treas.

FPM/ZM.

P. S. Your advise regarding the advertising the situation between the Thomson Co., and ourselves will be heeded, and will let the matter rest as it is for the time being."

X-Q. 33. Please produce the letter received from Mr. Warren referred to in the letter of January 28, 1913, as enclosed therewith?

A. The copy of the letter referred to in the letter of The National Electric Welder Co. of January 28, 1913, is produced, and reads as follows:

"COPY.
THE TOLEDO ELECTRIC WELDER CO.
Cincinnati, Ohio.
Jan. 25-1913.

Mr. F. P. McBerty,
c/o National Electric Welder Co.
Warren, Ohio.

Dear Sir:—

Yours of the 24th at hand, and the matters we want to talk over with you can be discussed at a personal interview better than in any other way. If you will come to Cincinnati, we will be very glad to pay your expenses, and would ask that

you arrange to come at as early a date as possible, as we believe it of sufficient importance to go over the matter we have in mind, to drop everything else at the present time, to get together. If you will accede to our proposal to come here we will explain the proposed deal, and it is not our intention to have you left out as long as we originally started in to work together. There was a disposition on the part of some parties to ignore the National Co. but this we would not allow. We were invited to attend a conference in Cleveland, and expected to see you there, but found that you were not expected.

We trust that you will accept our suggestion and come here at the earliest possible moment, as we believe a definite decision will be reached within the next week as to what action will be taken by the different interests, and we believe it of more importance to you than ourselves to have a meeting very quickly.

Yours respectfully,
(Signed) F. W. WARREN."

X-Q. 34. After the death of Mr. McGill, did the firm of McGill & McGuire continue as attorneys for the National Electric Welder Co. or Mr. McBerty?

A. The firm of McGill & Maguire has represented The National Electric Welder Co. and Mr. McBerty.

X-Q. 35. Has that representation continued to the present time?

A. Yes.

X-Q. 36. Have you in your files any correspondence between Mr. J. Nota McGill and The Toledo Electric Welder Co., or any officer thereof?

A. That I could not say without an examination of our files.

X-Q. 37. Will you please examine your files during the year 1910 and state whether or not there was any such correspondence?

(Mr. Church: Counsel for defendant objects to this line of examination as not proper cross-examination. The cross-examination of this witness has already gone far afield. In respect of other matters than those upon which the direct examination of the witness was predicated plaintiff is entitled to call the witness as its own witness. Having, however, no purpose to restrict the cross-examination beyond reasonable limits, counsel for defendant asks counsel for plaintiff his purpose in asking the last question put.)

(Mr. Holmes: Counsel for defendant in the hearing at Detroit and at this hearing has introduced in evidence letters and copies of letters to and from Mr. McGill, having an alleged bearing on an alleged use of the process of the patent in suit by Mr. McBerty in the year 1901 and also as having an alleged bearing on the question of the conduct of a suit by the Thom-

son Electric Welding Company against Barney & Berry. Counsel for defendant has thereby opened up the files of Mr. McGill and used such letters as he desired to produce having alleged bearing on these matters and it is manifestly improper for defendant to use part of this file without producing the whole file.)

(Q. 37 is repeated.)

(Mr. Church: Counsel for defendant replies that this witness was produced for the purpose of identifying and proving two letters from The National Electric Welder Company to the late J. Nota McGill, Esq., and the proposed continuation of his cross-examination is deemed to be, under Federal Practice, entirely incompetent, irrelevant and immaterial and not proper cross-examination, and the witness is advised that he may not make answer to the last cross-question proposed, unless directed to do so by order of court.)

A. I decline to answer the last question unless directed so to do by a court of competent jurisdiction.

X-Q. 38. Have you in the files of your office any correspondence between the late J. Nota McGill or the firm which succeeded him, and the Toledo Electric Welder Co., or any officer thereof which has reference to or mentions a certain claim of one F. P. McBerty to have used the process of spot welding in the years 1901-2 or 3 at Warren, Ohio, or which has reference to or mentions any fan blades alleged to have been spot welded by Mr. McBerty, as aforesaid, or which mentions or has reference to the defense by the Toledo Electric Welder Co., of a suit brought by the Thomson Electric Welder Company, in which the Toledo Electric Welder Co. was interested. I limit my question to correspondence beginning in the year 1910.

(Mr. Church: Question objected to as incompetent, irrelevant and immaterial and not proper cross-examination and the former suggestion to the witness is repeated.)

A. I decline to answer the foregoing question except under authority of a court of competent jurisdiction.

X-Q. 39. Will you please produce such correspondence between J. Nota McGill and the Toledo Electric Welder Co. as may refer to or mention each or any of the matters outlined in X-Q. 38?

(Mr. Church: Last objection repeated.)

A. The answer to the preceding question is repeated as answer to this.

X-Q. 40. Were all letters written by the late J. Nota McGill to Mr. McBerty addressed to The National Electric Welder Co.?

A. I cannot answer definitely as to this because there may have been some letters directed to Mr. McBerty personally.

X-Q. 41. Will you please determine from your files whether there are copies of any letters addressed to Mr. McBerty personally, commencing the year 1910?

A. I shall be very glad to do so.

X-Q. 42. Have you examined the file of Mr. McGill's correspondence commencing the year 1910 to determine whether or not there are any such letters?

(Mr .Church: Same objection.)

A. I have not done so.

X-Q. 43. Will you please do so?

(Mr. Church: Same objection.)

A. That will require a considerable amount of time.

X-Q. 44. I asked you if you would so so?

(Mr. Church: The objection is repeated and the witness is instructed that he need not make the examination suggested without an order of court directing him to do so.)

A. If directed by an order of a court of competent jurisdiction I will make the examination.

X-Q. 45. Do you decline to do so unless so ordered?

A. I do.

X-Q. 46. Will you kindly produce any copies of letters which there may be in the files of your firm from Mr. McGill to Mr. McBerty, having reference to or mentioning an alleged use by Mr. McBerty of the process of spot welding at Warren, Ohio?

(Mr. Church: Same objection and direction.)

A. I will not produce any such letters except under authority of court.

X-Q. 47. Will you produce any letters or copies thereof which may be in your files from the late Mr. McGill to Mr. McBerty, having reference to or mentioning any fan blades alleged to have been spot welded by Mr. McBerty, at Warren, Ohio, or mentioning or having reference to the conduct by the Toledo Electric Welder Co. of a suit brought by the Thomson Electric Welding Co., in the defense of which the Toledo Co. was interested? I ask you to produce letters or copies thereof having relation to or mentioning either or both of these matters?

(Mr. Church: Same objection and direction.)

A. Same answer as to the preceding question.

X-Q. 48. The letter of January 29, 1913, quoted in the record, in answer to X-Q. 31, has the notation at the top "817." Will you

please produce the letter at page 817 which according to your testimony this notation refers to?

A. I produce letter book No. 50, where at page 817 there is a letter dated January 27th, 1913, addressed to The National Electric Welder Co., which reads as follows:

"27th January, 1913.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I enclose herewith a copy of a letter I have just received from Mr. Fish, the Thomson Company's attorney, and a copy of my reply. Do you want me to go to New York to confer with Mr. Fish?

I have your letter of the 24th instant. At this stage of the matter do not advertise your attitude in respect to the Thomson Company. I think the subject of bond should remain in abeyance until after Mr. Fish and I conclude negotiations. What I want is to get you out of this trouble or to secure some terms for you without including either of the other companies. Evidently they are carrying on negotiations independently of you, and naturally are looking out for their own ends. When they feel the helplessness of their situation they recall your existence.

If the Thomson people decline to deal with us, we can then arrange with a surety company for bond and also determine on the advertising policy.

I note that William Smith, now of Charleston, West Virginia, recalls the use of the spot welder. If necessary, I will prepare an affidavit for him to execute.

Yes, I would like to see the Harmatta file *at once* before I either see or communicate with Mr. Fish.

Very truly yours,

J. NOTA MCGILL.

Enclosure."

X-Q. 49. Will you please produce the letter from National Electric Welder Co. to Mr. McGill, of January 24, 1913, referred to in this letter of January 27th?

A. I produce a letter from The National Electric Welder Company, dated January 24, 1913, to J. Nota McGill, which reads as follows:

"Warren, Ohio, January 24th, 1913.

J. Nota McGill,
Attorney At Law,
Washington, D. C.

Dear Sir:—

We have been requested by a number of firms, among others The General Fireproofing Co., in Youngstown, O., to

give them a bond to protect them against incurred expense of litigation, due to the threats made by The Thomson Co. The writer had some conversation with Mr. White of the above mentioned company, who suggested that if I was in a position to put up a good fight with the Thomson Co., on this spot welding proposition, it might be policy to advertise the fact.

I am therefore writing to ask whether you could take up this matter of patent situation, and our ability to prove a good case with a representative of some good bonding company. For instance, The American Surety Co., and go over with their attorney the situation in detail, and if they consider our chances as good we have no doubt but they would bond us for a reasonable price of a machine, we would then advertise the fact that we would sell our machines with a guaranteed bond with some surety company. This would result in attracting considerable attention to the NATIONAL" welders, and enable us to secure a line of business which would not be in competition with the Toledo and Winfield Co's, due to the fact that they would not dare to advertise in such a manner themselves, and it would also bring to a head the patent situation between the Thomson and National Co's, promptly.

As I look at the situation, the Thomson Co., may consider the National Co., as being very small, not spending much money pushing the business, and for this reason think it policy to ignore us entirely and continue their intimidation in advertising, with the result they would check the efforts of the Toledo and Winfield Co's., and unless we started something ourselves we would never get to a final show down at all.

I will be pleased to have you express your opinion on this subject at your earliest convenience, and also advise us whether you consider it policy to give a bond covering the sale price of a machine.

In connection with our evidence we have been securing, I have located another witness to the building and demonstrating of the old welder, in the person of William Smith formerly of this city, who is now superintendent of some firm in Charleston W. Va. I was talking with him this A.M. and he remembers very well the use of the machine as a spot, butt welder, also as a welding machine for welding wire, such as is covered by the "Clinton" patents. Mr. Smith was employeed by The Warren Elec. and Specialty Co., in 1899, 1900 and he has been with The Peerless Elec. Co., until about one year ago. He is a man of un-questionable integrity, is exceedingly well liked and well known in this city, and further more has a wide range of electrical knowledge. He can identify the changes that have been made on the old machine, remembers how it was originally built, and did considerable work on the machine himself. He was very much interested in the welder as it was the first machine of the type he ever saw. If you

think it policy, and will outline the statement, Mr. Smith will be glad to supply all the information he possibly can, the same as Powers, Lipps and Brown.

We were in receipt of a letter from Mr. Warren, of The Toledo Elec. Welder Co., as per enclosed copy. We are also enclosing herewith copy of our reply. The writer thinks it policy to keep on friendly terms with The Toledo Co.

Hoping to have the pleasure of hearing from you at an early date regarding the matters mentioned, we are

Very respectfully yours,
THE NATIONAL ELEC. WELDER CO.
per
F. P. McBERTY,
Sec'y and Treas.

EPM/ZM

P.S. We have just been in receipt of the copies of file wrappers of the Harmatta case, from The Winfield Co. These were sent by Mr. Warren. Would you care to have copies?

X-Q. 50. Will you please produce the copy of the letter from Mr. Warren and the copy of the reply from Mr. McBerty referred to in the letter of January 24, 1913, just read into the evidence?

A. I produce copy of letter dated January 23, 1913, from Warren to National Electric Welder Co. and a copy of a letter dated January 24, 1913, addressed to The Toledo Electric Welder Co., attention Mr. F. W. Warren, from The National Elec. Welder Co. These letters read as follows:

"COPY.
THE TOLEDO ELECTRIC WELDER CO.
Cincinnati, Ohio.

Jan. 23-1913.

National Electric Welder Co.
Warren, Ohio.

Gentlemen:

We wrote you a short time ago regarding an interview that was to be held with representatives of the Thomson and Universal Co. The appointment was made by the Winfield Co. and Mr. Macneale and the writer went to Cleveland to attend the meeting. A proposition was put up to us, but we told them very plainly that your company would have to be included in any arrangement that was made.

Mr. Lachman went back East, but is going to return in a week or ten days and we believe it of the utmost importance that Mr. McBerty meets us before that time. We cannot very well enter into details of the proposition by correspondence, and would ask if he can come here to talk over the matter, as we firmly believe it is to his interest to do so. We would

like to have a meeting at the earliset possible moment, and if Mr. McBerty is not at home, will you kindly let us know where he can be reached by wire or letter so that we can make an appointment with him?

Very respectfully yours,
THE TOLEDO ELECTRIC WELDER CO.
(Signed) FRANK WARREN."

"Copy.

"January 24th, 1913.

The Toledo Electric Welder Co.,
Cincinnati, O.

Attention Mr. F. W. Warren.

Gentlemen:—

Re. yours January 23rd, 1913.

We have noted that you were present at a meeting held by representatives of the Universal and Winfield Co's, and the writer is surprised that Mr. Winfield did not notify the writer. In line with this same information beg to advise we have not heard a word from Winfield since the meeting at The Park Hotel, some time since.

There is no doubt but the Winfield Co., are doing all they can to eliminate the National Co., from this arrangement and under the circumstances it is entirely satisfactory.

The writer has been out of the city most of the time since you were here and am leaving again today for a few days, but expect to return within three or four days, will advise definite date of meeting when I return, if possible.

I note that Lackman is the man you are apparently dealing with, and am wondering why you are not dealing directly with the Thomson Co., as I understand Lackman is absolutely independent of the Thomson Co., other than his connection in a business way through the sale of the machines. It would seem to the writer that the Thomson Co., would be the ones to deal with.

Lackman's only interest is in lining up the independent manufacturers so as to get a good proposition to lay before the Thomson Co., which will enable them to hold the Thomson Co., to their present arrangement, which is apparently satisfactory to the Universal Co. Any arrangements made with Lackman will finally have to be sanctioned by the Thomson Co., and inasumch as the Universal Co., have no controlling vote or further interests in this other company, the writer cannot see how any agreement that is made can amount to anything more than merely putting the Universal Co., in a better position to deal with the Thomson Co.

Kindly let me hear an expression of your opinion regarding the subject mentioned.

We are pleased to advise that the Winfield Elec. Welding Machine Co., sent us a copy of the file wrappers of the Harmatt case.

Hoping to have the pleasure of seeing you within a short period, we are

Very respectfully yours,
THE NATIONAL ELEC. WELDER CO.
per
FPM/ZM *Sec'y and Treas.*"

X-Q. 51. In order to save time will you kindly produce for my inspection the complete file of correspondence between the late Mr. McGill and The National Electric Welder Co., commencing the year 1910?

(Mr .Church: Objected to as incompetent, irrelevant and immaterial, and not proper cross-examinatoin and the witness is directed not to answer unless required by an order of court.)

A. I decline to do so unless by order of court.

X-Q. 52. Will you please produce a complete file of the correspondence between The National Electric Welder Co. and the late Mr. McGill having any reference to the matter of any alleged spot welding alleged to have been done by Mr. McBerty at Warren, Ohio, in the year 1901, or having any reference to the case brought by the Thomson Electric Welding Company against Barney & Berry, in which the Toledo Electric Welder Co. was interested or having any reference to certain fan blades alleged to have been spot welded by Mr. McBerty at Warren, Ohio, in 1901?

(Mr. Church: Same objection and instructions.)

A. Same answer as to previous question.

X-Q. 53. Do you decline to produce any further correspondence between the late Mr. McGill and The National Electric Welder Co. relating to any of these matters.

(Mr. Church: Same objection and instructions.)

A. I do.

X-Q. 54. Please produce any correspondence which may have been had between the firm of McGill & Maguire and The National Electric Welder Co. having any reference to any of the matters referred to in X-Q. 52?

(Mr. Church: Same objection and instructions.)

A. I must decline to do so unless ordered so to do by a court order.

X-Q. 55. Will you produce the correspondence in your files between the late Mr. McGill and the firm of Edwards, Sager & Wooster, or Mr. Edwards, of that firm, or Mr. Thomas Howe, having any reference to the matters mentioned in X-Q. 52?

A. I must decline to do so, unless authorized by court order.

X-Q. 56. Will you please produce the copy of the letter referred to by the notation "659" on the copy of the letter of January 27, 1913?

A. The letter on page 659, Letter Book 50, is produced, and reads as follows:

"11th January, 1913.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I have your letter of the 9th instant enclosing second affidavit of Mr. Frank G. Brown. I have not yet heard from the Thomson Electric Welding Co., but this is not surprising.

At present I expect to be in Columbus on Thursday instead of Wednesday of next week, and if Mr. McBerty will be at Warren on Friday, I will go there from Columbus, but not unless I am first advised that he will be in Warren.

Very truly yours,

J. NOTA MCGILL."

X-Q. 57. Will you please produce the letter of January 9th to Mr. McBerty, referred to in this letter of January 11th? Witness will please produce letters without reading them unless requested by counsel.

A. I produce letter of January 9, 1913, from The National Electric Welder Co. to J. Nota McGill, which reads as follows:

"Warren, Ohio, January 9th, 1913.

J. Nota McGill,
Washington, D. C.

Dear Sir:—

We are enclosing herewith revised statement from Frank G. Brown, Detroit, Mich. Our Mr. F. P. McBerty is in Detroit at the present time, having been there several days getting his evidence into shape.

He wishes us to advise you that on talking with Mr. Brown, he finds that his first statement was not quite correct, as he had confused the welder with a platinum cutting and welding machine which was built for the Warren Electric & Specialty Company.

Mr. McBerty will be in Warren either Saturday morning or Sunday morning, and will proceed to have photographs taken of the small welder, and no doubt, he will be ready for you by Tuesday or Wednesday of next week.

We will wire you just when we think it advisable for you to come to Warren.

Thanking you for past favors, we are

Very respectfully yours,

THE NATIONAL ELEC. WELDER CO.

per

ZAM/LS *Assistant Sec'y.*"

X-Q. 58. Will you please produce the letter referred to by the notation "612" on the letter press copy of the letter of January 11th, 1913?

A. The letter appearing on page 612 of Letter Book No. 50 is as follows:

"8th January, 1913.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I have your favor of the 6th instant enclosing statement of Mr. J. W. Powers. I may be in Columbus on Wednesday next, the 15th instant, and if so I shall spend the next day in Warren.

Very truly yours,

J. NOTA MCGILL."

X-Q. 59. Will you kindly produce the letter of January 6th referred to in this letter?

A. The letter of January 6th referred to in the letter from J. Nota McGill to The National Electric Welder Co., of January 8th, 1913, reads as follows:

"Warren, Ohio, January 6th, 1912.

J. Nota McGill,
Washington, D. C.

Dear Sir:—

Your favor of the 4th inst., received.

Mr. McBerty is in Detroit, Mich., and the writer has forwarded your letter to him. Mr. McBerty will no doubt advise you from Detroit just when he thinks advisable for you to come to Warren.

We are enclosing herewith statement taken from Mr. J. W. Powers. This statement was taken here at the office Sunday the 5th inst., dated the 4th, and Mr. Powers took the original statement back with him to Findlay and will have the same sworn to before a NOTARY PUBLIC, today.

Very respectfully yours,

THE NATIONAL ELEC. WELDER CO.

per

Z. A. MCBERTY,
Assistant Sec'y and Treas.

ZAM"

X-Q. 60. Have you the statement taken from Mr. J. W. Powers referred to as enclosed in this letter?

A. No, I have not.

X-Q. 61. Will you produce Mr. McGill's letter of January 4th, 1913, referred to in the last letter just produced?

A. The letter referred to is on page 567 of Letter Book No. 50 and reads as follows:

"4th January, 1913.

The National Electric Welder Co.
Warren, Ohio.

Dear Sirs:

Re: Thomson Electric Welding Co.

I note all that you say in your favor of the 2nd instant. Please let me have a photograph or several of them taken at different angles of the spot welding machine which was constructed in 1901. To be of value as evidence of prior use it must not appear that this was a mere abandoned experiment, but it must be shown that the machine was used for spot welding. If the evidence is not sufficient to substantiate our allegation of prior use, it may be sufficient to substantiate our allegation of prior knowledge.

I have written the Thomson (not Thompson) Electric Welding Company, and enclose herewith a copy of my letter. I ought to see the machine you have in your custody before it is submitted to the attorney for the Thomson people. I entertain no doubt that I shall soon hear from their attorney and that he will want to see the machine. Before showing it to him I want to understand it more clearly. The affidavits submitted are not wholly sufficient, but I do not want to suggest any change until after I see the machine. I take it that you have not involved yourselves with other manufacturers of spot welding machines and that, so far as this matter is concerned, you want to protect yourselves. If the Thomson people will grant you a license, you can afford to surrender your evidence. If they will not grant you a license, you might arrange then with the Toledo people that in consideration of placing in their hands the evidence you possess they are to pay three-fourths of the expense of any litigation that may be brought either against you or themselves. My idea is to ignore the Winfield Company.

I am inclined to think it is policy to hunt for business and promise your customers that you will take care of them. I cannot say more than this until I see the machine. I do not like to put you to the expense of my going to Warren solely for that purpose, but I think it would be advisable to have me make the trip even though nothing else calls me in that direction. The matter can stand for the time being if Thom-

son's attorney does not promptly take up the subject, but once he communicates with me then I will have to arrange to see the machine before showing it to him.

Very truly yours,

J. NOTA MCGILL.

Enclosure"

X-Q. 62. Will you turn to Letter Press Book No. 54 and produce the letter shown therein from Mr. McGill to The National Electric Welder Co. next after that of April 22, 1914, which you read in the evidence in answer to X-Q. 25?

A. On reference to that letter I find that it pertains to the payment of a final Government fee on an application for patent.

X-Q. 63. Will you kindly show me the copy of the letter from Mr. McGill to the National Electric Welder Co. next after April 22, 1914, having any reference to the case of Thomson Electric Welding Co. vs. Barney & Berry, or to any alleged spot welding done by Mr. McBerty at Warren, Ohio, in 1901?

A. The next letter in Letter Book 54, following that of April 22, 1914, having any bearing on the matters referred to in the question is one appearing at page 555 and which reads as follows:

"30th April, 1914.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

Upon my return this morning I find your letter of the 24th instant and also one from Mr. Edwards. He tells nothing of importance, and fails to explain why he did not amend his answer to lay foundation for your testimony as to priority.

Very truly yours,

J. NOTA MCGILL.

M.I."

X-Q. 64. Will you please produce the letter under date of January 2nd, 1913, referred to in the letter of January 4th, 1913, which you produced in answer to X-Q. 61?

A. The letter referred to reads as follows:

"Warren, Ohio, Jan. 2nd, 1912.

J. Nota McGill,
Washington, D. C.

Dear Sir:—

We are enclosing herewith copy of notification regarding the patent situation, from the Thompson Co. We are also sending statements made by Mr. F. G. Brown, Detroit, Mich. and Mr. E. C. Lipps, Detroit, Mich. These gentlemen are old shop mates of the writers, and men with excellent mechanical ability.

I am leaving tonight for Detroit and will take up with Mr. Brown the matter of the date on his statement covering the time of the electric welder, as you will note his date is 1900, while Mr. Lipps date is 1901. This is apparently a mistake made by the stenographer in making it 1900 instead of 1901.

As I advised you before I have with me here at the factory the old welder which was originally designed for a butt welder, but on which we did the spot welding, together with the transformer which was used in connection with the machine. We also have the original factory records which shows the date on which this transformer was designed, and would further say the transformer was designed and built for a pneumatic wheel company in New Jersey to enable them to find out what voltage was necessary to give the proper results in welding, and was sent out for that purpose. After the company had used it they returned it to The Warren Elec. and Specialty Co., and they then built them a larger welding transformer for their machine.

The small welding transformer which was returned to The Warren Elec. and Specialty Co., was then turned over to the fan motor dep't and was used in connection with this electric welding machine. The date of the manufacture of this transformer was June, 1900, and the transformer was returned to The Warren Elec. and Specialty Co., in the fall of the same year. The same was turned over to the fan motor dep't Jan. 25th 1901.

Mr. McCurdy, who has been with the Warren Elec. and Spec. Co., and The Peerless Elec. Co. for years, also my partner in the Enterprise Elec. Co., this city, can identify these dates.

I am now going out to get our shop superintendents statement regarding the building and demonstrating of the butt and spot welder which was done on this machine in 1901. This gentleman is Superintendent of The Buckeye Traction Ditcher Co., in Findlay, O., at the present time, and after that I have one more statement to secure from one of the men now employeed by The Peerless Elec. Co., this city. These latter statements I will forward just as soon as I get them lined up, and will get them up in better shape if you think necessary. I have sent you copies only of the statements. I have the originals which are signed up by a Notary Public. If you can suggest anything to make these more water tight, kindly do so at your early convenience.

I have also samples of spot welding which was done on the welder at the time we did this experimenting, and while we are unable to identify the exact date, we can approximate it within two or three months.

There is one more thing about which I wish to advise you and that is: The idea of developing the butt welding machine was to enable us to manufacture a cheaper grade of fan than

the ones we were making at that time, and all fan motors of that desk fan type, had at that time brass blades and blade holders, or centers. Our idea was to make a steel blade and a steel center, and when we did that we proved out this electric spot welding process. These blades were to be painted or japanned black, and the guards were to be tin coated.

The company however were still manufacturing the high grade fans which necessitated brass blades and brass centers, and while we punched the blades with the same dies, it would have been necessary to have one set of dies arranged to punch the holes for rivets in the brass blades and another set of dies to punch holes for rivets in the blades and another set of dies without punches to make holes for rivets for the steel blades. This was considered at the time as being an objection as it necessitated added equipment which would not be necessary if we riveted all the blades, both brass and steel. We, however brass plated the steel blades after that time and found it took a very good finish, but Mr. Gillmer did not advocate the use of the spot welding of the steel blades, as we had already manufactured our punches, dies and had brass rivets in stock.

I feel that we have a particularly good case, and I want you to frankly criticise, and put it up to us in any way possible where we are liable to "stub our toes" on this, and when we finally get our evidence lined up, we want you to handle this deal with the Thompson Co., if you think we are in a position to offer to deal with them.

We have also heard from the "Toledo" Elec. Welder Co., and The "Windfield" Co., both of whom are very anxious to find out what I have in the way of information that can be used to advantage to them if they were able to get ahold of it and put up a fight against the "Thompson" Co.

The "Toledo" company are organized for $75,000.00 all paid in and good for this amount, but the "Winfield" company are not considered as being a good financial proposition at all.

Kindly advise what steps we are to take regarding the "Thompson" Co., and whether it is policy to hunt for business and promise our customers that we will be in a position to take care of them in case suit is entered against them or ourselves.

We would suggest that you secure a copy of the January 1913, issue of "Machinery" and look on page 182, you will see what the "Thompson" company have to say regarding the patent issued them recently.

In connection with the patent situation, Mr. Warren of the "Toledo" Co., has spent considerable money securing information regarding the various moves which have been made in securing the "Harmatta" patent, and he promised to forward the same to us, which would enable us to get copies.

Under the circumstances I told him we would be interested in securing this information, and when the same is forwarded to us we will be pleased to furnish you copies if you so desire.

Hoping we can get the matter straightened out in the near future, I am,

Very respectfully yours,
F. P. McBERTY,
Sec'y and Treas.
The National Elec. Welder Co.

The matter appearing in the 9th paragraph of this letter is confused and is corrected by letter of The National Electric Welder Co., dated February 10th, 1913, which reads as follows:

"Warren, Ohio. Feb'y 10th, 1913.

J. Nota McGill,
Attorney At Law,
Washington, D. C.

Dear Sir:— Re. yours Feb'y 7th, 1913.

We are enclosing herewith copy of paragraph as it should have read in our letter to you January 2nd, 1912.

'The company however were still manufacturing the high grade fans which necessitated brass blades and brass centers, and while we punched the blades with the same dies, it would have been necessary to have one set of dies arranged to punch holes for rivets in the brass blades and another set of dies without punches to make holes for rivets for the steel blades. This was considered at the time as being an objection, as it necessitated added equipment which would not be necessary if we riveted all the blades, both brass and steel. We however brass plated the steel blades after that time and found it took a very good finish, but Mr. Gillmer did not advocate the use of the spot welding of the steel blades, as we had already manufactured our punches dies and had brass rivets in stock.'

Regretting this typographical error we are,

Very respectfully yours,
THE NATIONAL ELEC. WELDER CO.
per
F. P. McBERTY,
Sec'y and Treas."

FPM/ZM

X-Q. 65. Will you please state what the notations are, in pencil, on page 2 of the letter of January 2nd, from Mr. McBerty just copied?

A. The first notation is an insertion of the name "J. W. Powers,'" after the word "gentleman" in line 4, the name being in the handwriting of the late J. Nota McGill. The second notation also in the handwriting of J. Nota McGill is the name "Robt. Bean"

inserted after the word "employed" in the 6th line of page 2. The paragraph in which these notations are made begins "I am now going out."

X-Q. 66. Will you please produce Mr. McGill's letter of February 7th, 1913, referred to in McBerty's letter of February 10th, 1913?

A. The letter of February 7th, 1913, referred to in the question appears at page 966 of Letter Book No. 50, and reads as follows:

"7th February, 1913.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

Please refer to your letter to me dated January 2, 1912. In the fourth paragraph page 2, lines 5 and 6, is there not some confusion? This reads:

'* * * for rivets in the brass blades and another set of dies to punch holes for rivets in the blades and another set of dies without punches to make holes for rivets for the steel blades.'

I wish you would throw a little light on this subject, and let me hear from you by early mail.

I have an engagement with Mr. Fish for Thursday of next week in New York.

Please look over the enclosed statement which I have prepared to hand Mr. Fish. Correct it wherever necessary. Please return it by early mail.

Very truly yours,
J. NOTA MCGILL.

Enclosure"

X-Q. 67. Have you the statement prepared for Mr. Fish referred to in this letter?

A. I have not.

X-Q. 68. Noted on the letter of February 10, 1913, to Mr. McBerty, in pencil, are the figures "2/11/13." Will you kindly produce the letter of that date evidently referred to by this notation?

A. The letter referred to by the pencil notation appears in Letter Book 51 at page 4, and reads as follows:

"11th February, 1913.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I have your letter of the 10th instant correcting the statement in your letter of January 2nd. I now understand that it was the purpose to make both the brass and steel blades with the same dies, but if the steel blades were spot-welded, holes would not be punched in them, hence they could not be made with the dies used for punching the brass blades since the lat-

ter had to have the holes made therein at the time of their formation.

I shall advise you as to the result of my conference with Mr. Fish.

Very truly yours,
J. NOTA MCGILL."

X-Q. 69. Referring to the letter of January 4th, 1913, on page 567 of Letter Book No. 50, will you please produce copy of the letter next preceding that from Mr. McGill to the National Electric Welder Co.

A. The letter relates to an interference and is in no sense in reference to this matter.

X-Q. 70. Will you please produce the next preceding letter?

A. The next preceding letter appears at page 375 of Letter Book 50 and reads as follows:

"13th December, 1912.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

Taylor vs. Warren.

I have received the concession of priority signed by Warren, but I have returned it for the corporate seal.

In thinking over the Harmatta patent, it occurs to me that it might be to your interests not to enter into any alliance with other manufacturers having for its object the making of terms with Thomson Co. If your evidence is, as it now appears to be, sufficient to invalidate the Harmatta patent, the Thomson people would doubtless be willing to negotiate with you on satisfactory terms, provided they were not compelled to similarly deal with your competitors. If there is any reason for giving the latter the benefit of the defense you have, then, of course, they will continue to be competitors. I suggest these things for your consideration.

Very truly yours,
J. NOTA MCGILL."

X-Q. 71. Referring to the letter of January 2, 1913, from Mr. McBerty to Mr. McGill, produced by you in answer to X-Q. 64, will you kindly produce the next preceding letter in order of time from Mr. BcBerty to Mr. McGill having any reference to the alleged spot welder by Mr. McBerty, at the Warren Company?

A. The next letter preceding that of January 2, 1913, from Mr. McBerty to Mr. McGill, relating to the spot welder matter, appears to be one dated December 9, 1912, which reads as follows:

"Warren, Ohio. December 9th, 1912.

J. Nota McGill.
Attorney At Law
Washington, D. C.
Dear Sir:—

We are returning herewith license signed up as per your request.

The writer has before him copy of the patent granted to the Thompson Co., but regret that I have not had an opportunity to look over the same carefully, as I just returned from a somewhat lengthy trip.

I expect to meet all parties interested in the manufacture of electric welding machines, excepting the Thompson Co., in Toledo, O. Wednesday of this week, and after that date I will be in a position to state definitely just what they expect to do, or think they can do regarding this patent situation.

In connection with this subject, I am interested in knowing whether if I manufactured a machine and did spot welding on it, before the application was made in England or the United States in a satisfactory; and practical manner, would this have bearing on the granting of the patent at the present date to the Thompson Co?

I have been looking up my witnesses and etc. on this matter and if we have any chance at all I am confident that we can either put up an extraordinary good fight, or be in a position to ask the Thompson Co., for a satisfactory settlement.

I will write you full details regarding the situation after my return from Toledo, Wednesday.

Thanking you for past courtesies, we are,

Very respectfully yours,
THE NATIONAL ELEC. WELDER CO.
per
F. P. McBERTY.
Sec'y and Treas.

FPM/ZM"

X-Q. 72. Will you kindly search the file again and tell me if there is any letter between December 9th, 1912 and January 2nd, 1913, from Mr. McBerty to Mr. McGill, having reference to this same subject matter?

I have searched the file and fail to find any such letter.

X-Q. 73. You fail to find any letter between those dates from Mr. McBerty to Mr. McGill having any reference to the subject of spot welding.

A. That is correct.

X-Q. 74. Will you please produce the letter from Mr. McGill to Mr. McBerty under date of December 10, 1912?

A. The letter referred to in the question appears in Letter Book 50 at page 351 and reads as follows:

"10th December, 1912.

The National Electric Co.,
Warren, Ohio.

Dear Sirs:

I have your favor of the 9th instant enclosing the license, which I have forwarded to the Toledo Electric Welder Co.

Yes, broadly speaking, if you constructed and operated a spot welding machine before Harmatta's first filed foreign application, and he is unable to show that the invention has been communicated by him to others in this country prior to the construction and operation of your machine, such machine will constitute an anticipation of Harmatta, provided it was not an abandoned experiment. In other words, if the machine was constructed and used in an experimental way and then abandoned, it will not be available as a defense. If, on the other hand, it was long in use, and was used where it could be seen by people connected with the establishment, it would constitute a good defense.

I note with satisfaction that you have been looking up your witnesses. Have you also looked up the machine? In other words, is it still in use?

I suggest that you be very careful in dealing with the Thomson Company. Take the matter up with me before dealing with them.

Very truly yours,
J. NOTA MCGILL."

X-Q. 75. Will you please produce the letter next succeeding the letter of December 10th, 1912, from Mr. McGill to Mr. McBerty, having reference to spot welding?

A. There is no letter between these dates relating to this subject, except the letter of December 13, 1912, which is already in the record.

X-Q. 76. Will you please produce the letter next preceding that of December 10, 1912, from Mr. McGill to Mr. McBerty, having reference to the matter of spot welding?

A. The letter next preceding that of December 10, 1912, appears at page 308 of Letter Book 50, and reads as follows:

"4th December, 1912.

The National Electric Welder Co.,
Warren, Ohio.

Dear Sirs:

I am sending you under separate cover, a copy of the Harmatta patent No. 1,046,066, which issued yesterday. The claims are apparently very broad.

Very truly yours,
J. NOTA MCGILL.

Copy enclosed."

X-Q. 77. Will you please produce the letter from Mr. McBerty to Mr. McGill, next preceding that of December 9th, 1912, having any reference to spot welding or electric welding?

A. The next preceding letter is one dated November 25, 1912, forwarding to Mr. McGill, copies of letters passing between The National Electric Welder Co. and Mr. Johann Harmatta, asking the latter with reference to his patent in the United States.

X-Q. 78. Is there any correspondence in your files on this subject in the years 1910 or 1911?

A. I find no such correspondence.

X-Q. 79. Is there any correspondence between January 1, 1912 and November, 1912, relating to the same subject matter?

A. I find a letter dated January 9, 1912, from The National Electric Welder Co. to Mr. J. Nota McGill which reads as follows:

"Warren, Ohio, 1-9-12.

Mr. J. Nota McGill,
Washington D. C.

Dear Sir:—

Some six weeks ago we requested Mr. Upton to secure for us copies of all patents relating to metal heating and working, and after having spoken to him about the matter a couple of times we have decided to take the matter up with your office, hoping to get more prompt attention to our requests.

We want to get in touch with what has been done in the electric welding line, with reference to welding machines both butt and spot welders, welding of rings, hollow ware, also anything in the arc welding which may be of interest.

We would ask that you kindly send us at your earliest possible convenience copies of these patents, together with bill for same.

We are now writing up two different matters to see whether we can get patents or not, and just as soon as we get these copies, if we find that we are not covering ground already gone over, we wish to take these matters up with you.

We regret to say that through some mistake of Mr. Upton's of getting the drawings signed for the lever switch, we have been unable as yet to get our patents issued.

Thanking you for your prompt attention, we are,

Very respectfully yours,
THE NATIONAL ELEC. WELDER CO.
Per
F. P. MCBERTY,
Treas.

FPM/Z"

Mr. McGill's answer to this letter is dater January 11, 1912 and appears at page 242 of Letter Book 47, and is merely advising of the number of copies of patents in those classes relating to welding and the cost of the copies. The letter will not be copied unless counsel shall request.

Cross-examination closed.

Mr. Church requests that the letter from Mr. McGill to Mr. Edwards, dated April 30, 1914, and referred to by the witness in his cross-examination be copied into the record, which is accordingly done, as follows:

"30th April 1914.

C. V. Edwards, Esq.,
2 Rector Street,
New York.

Dear Sir:

I thank you for your favor of the 27th instant, which I find upon my return to the city this morning. It seems to me that even if the answer did not lay foundation for evidence as to priority of invention, the court should have admitted it subject to an amendment to the answer, and anyhow ought to have allowed it under Zane vs. Soffe 110 U. S.

If printed briefs are used will you kindly let me have a copy.

Very truly yours,
J. NOTA MCGILL.

M.I."

Signature and Certificate Waived.

IN THE DISTRICT COURT OF THE UNITED STATES

EASTERN DISTRICT OF MICHIGAN

SOUTHERN DIVISION

IN EQUITY

THOMSON SPOT WELDER COMPANY

vs.

FORD MOTOR COMPANY.

Warren, Ohio, July 10, 1919, 3.30 P.M.

Pursuant to agreement of counsel.

Present: A. S. PATTISON, ESQ., Counsel for Defendant.
J. L. STACKPOLE, ESQ., Counsel for Plaintiff.

Deposition taken on behalf of defendant by agreement of counsel under the equity rules of the Supreme Court of the United States and under the Revised Statutes. Before me W. S. Helsley, Notary Public and Special Examiner.

WILLIAM B. ENSOR.

WILLIAM B. ENSOR, of lawful age, being by me first duly sworn to tell the truth, the whole truth and nothing but the truth, deposes and says as follows:

Direct examination by MR. PATTISON:

Question 1. Please state your name and age?

Answer. My name is William B. Ensor, age twenty-nine.

Q. 2. Where do you live?

A. Leavittsburg, Ohio.

Q. 3. What is your present employment?

A. I am in the service department of the Peerless Electric Company.

Q. 4. When did your employment begin there?

A. I began working for them January 1, 1911.

Q. 5. Have you during your employment with the Peerless Company seen a rivetless fan blade at that factory?

A. I did at one time.

Q. 6. Under what circumstances did you see it?

A. Shortly after I went to work for the Peerless Electric Company I was put in the experimental department developing a new line of one phase motors and we were looking for some resistance coils in the old stock house among a collection of old fans and repair parts and returned goods and so forth for these resistance coils. Mr. Kargeau and I went to the old stock house and I ran across an old Stanley Patterson fan that had a peculiar looking blade on it which attracted my attention to it because it did not have any rivets. I asked Kargeau what the thing was and he looked at it in an easy going sort of fashion and said he didn't know. We

looked it over and I asked him how he supposed the thing was fastened on there and he said he supposed some kind of welding proposition. I saw the fan and I looked it over very carefully, being young in the business I was very much interested in it, pretty much interested in any new thing that came around. I didn't seem to be able to get any particular interest roused up in Kargeau and I didn't pay much more attention to it.

Q. 7. Whose manufacture of fan was it?

A. The Warren Electric & Specialty Company. It was an older type than the Peerless Electric Company.

Q. 8. And Stanley Patterson Company, who are they?

A. They were the New York Agent, jobbers of the Peerless Electric Company, they sold for both concerns.

Q. 9. Are you sure that the blade referred to by you was a riveteless blade?

A. Oh, yes, no question about it. The blade was a black Japan blade and was perfectly smooth. My attention would not have been called to it if it had had rivets in it.

Q. 10. Where in the factory did you see the fan with the riveteless blade?

A. It was on the rack of repairs and returned stuff, this returned goods in what we now know as the stock room, there was a rack there on which returned goods were put that might be useful for repairs at some future date. These old fans are pretty valuable to us to get repair parts from.

Q. 11. Returned fans. Please explain what you mean by that.

A. Well, fans that have been returned as defective or returned for exchange, or replacement. So many times customers want to change them, find some minor defect with the fan and they return it to us.

Q. 12. Did you examine this fan sufficiently to see if it had been previously used?

A. Oh, it had been used. There was nothing put in that place except fans that had been used.

Q. 13. They had been out to the trade and came back?

A. No new fans were put in there. I suppose the average man would call it a junk room.

Q. 14. What was the condition of the blade when you examined it?

A. I didn't see anything wrong with it, didn't notice anything wrong with it.

Q. 15. Did the blades seem to be held securely in place?

A. Seemed to be all right so far as I noticed. Just an ordinary fan blade except it didn't have any rivets. I didn't see anything wrong with it.

Q. 16. When a fan is placed in the factory where you saw the one referred to what if anything does that location mean?

A. Well, it would mean it was an old fan, I suppose it would mean it had been out in service, no new stuff was put in there of

any kind and nothing has ever been put there that would be of recent manufacture, it would be an old fan.

Q. 17. What became of the fan, or the rivetless blade, if you know?

A. I don't know, it just disappeared.

Q. 18. Did you look for it at any time?

A. I have looked for it but I have been unable to find it. I noticed it out there on a few different occasions after that when I was looking for more repair parts but I couldn't say exactly what time it disappeared because I was taken off that work and put on the same work I am now engaged in, in other words, the engineering of service repairs and I was on that work for I think about a year, then I was put in the assembling department as foreman and during that period I knew nothing about repair parts aside from the ones that came in my own department and I lost all track of this old stuff that lay in the old stock house.

Q. 19. What is the custom of the Peerless Company if called upon for a fan blade of the older type that they were not manufacturing at the time the call came?

A. Well, if we can find one of them we ship it. On numerous occasions I have taken blades off of old fans, some that were down in our basement on obsolete fans. I have made a practice of removing repair parts from these and shipping them out, it is the only way you have to get these obsolete parts. We have so many different parts of fans and motors that we do not attempt to carry in our finished stock duplicates of all these old repair parts and once in a while it happens that we do have them in the junk pile that I have mentioned before or in some other department of the establishment, returned fans that are mechanically defective, or certain parts of them and we take these parts and refinish them and ship them out to the customer for repairs.

Q. 20. Do you know Mr. Newton Smith?

A. I have met him.

Q. 21. Please explain the circumstances.

A. He has been in our plant, we were looking for fans. I think I was with him on just one occasion. He was looking for an old type of fan.

Q. 22. Did he buy one?

A. Yes, I think Mr. Smith bought a fan.

(By Mr. Stackpole: Mr. Smith being present says he bought a Colonial fan.)

(By the Wintess: Mr. Smith was in and bought an old type fan. He was unable to get the fan with the Peerless name plate on it so he took one with the Colonial plate on it and knew it was made by the same company and in every way the same fan.)

Q. 23. Was anything said about this rivetless fan blade you had seen to Mr. Smith?

A. I mentioned to him having found the thing. Expressed regret that I was unable to locate it at the present time.

Q. 24. Have you any interest whatever in this question of spot welded fan or of the McBerty welder?

A. Not in the least.

Q. 25. Or of the result of this suit?

A. Not in the least.

Q. 26. Will you please give the full name of Kargeau to whom you have referred?

A. Theodore is his first name, he always wrote his name as T. Kargeau but Theodore is his name.

Q. 27. Do you know where he is now?

A. No, I do not, he went from here to Sarasota, Florida, he went on a fruit farm down there.

Q. 28. And that place in Florida you have referred to?

A. Sarasota.

Q. 29. How long since you heard from him?

A. Oh, I haven't heard from him for five years, I should say.

Q. 30. When did you meet me?

A. Yesterday.

Q. 31. Where?

A. Peerless Electric Company.

Q. 32. Who introduced me to you?

A. Mr. McBerty.

Cross-examination by MR. STACKPOLE:

X-Q. 33. Before you testified today were you shown Plaintiff's Exhibit Thirty-eight?

A. May I ask the counsel a question, if that is the same picture he showed me? It looks like the same picture, yes.

X-Q. 34. Are you sure?

A. Yes, that is the same picture I saw or one just exactly like it. That is a picture of the type G fan.

Re-direct examination by MR. PATTISON:

Re-D. Q. 35. When did I show you this picture?

A. About five minutes ago.

Re-D. Q. 36. In the other room just before you came in to testify?

A. Yes.

IN THE DISTRICT COURT OF THE UNITED STATES

EASTERN DISTRICT OF MICHIGAN

SOUTHERN DIVISION

THOMSON SPOT WELDER COMPANY

vs.

FORD MOTOR COMPANY.

Met pursuant to agreement of counsel.

Present: J. L. STACKPOLE, ESQ., counsel for plaintiff, and
A. S. PATTISON, ESQ., counsel for defendant.

Depositions taken on behalf of defendant under the Equity Rules of the Supreme Court of the United States, and under the Revised Statutes, before Carl D. Rice, Esq., Notary Public and Special Examiner, at Warren, Ohio, July 24, 1919.

JOHN B. ESTERBROOK.

JOHN B. ESTERBROOK, a witnessed called in behalf of the defendant, being first duly sworn, deposes as follows:

Direct examination by MR. PATTISON:

Question 1. What is your full name, and residence?

Answer. John B. Esterbrook, Warren, Ohio.

Q. 2. What is your present occupation?

A. Secretary and Treasurer of The Sun Light Electric Manufacturing Company.

Q. 3. How long have you been connected with that company?

A. Two years.

Q. 4. What was your occupation prior to your connection with the above mentioned company?

A. Secretary and salesman of The Peerless Electric Company.

Q. 5. Were you with the Peerless Electric Company in that capacity during the year 1913?

A. Yes, sir.

Q. 6. Are you acquainted with Mr. Fred P. McBerty of this city?

A. Yes, sir.

Q. 7. About how long have you known him?

A. I believe twenty-five (25) years.

Q. 8. While you were occupying that position with The Peerless Electric Company of this city, do you recall that Mr. McBerty came to that factory, the factory of that company, with another gentleman to make a search?

A. Yes, sir.

Q. 9. What, if you know, was the search for?

A. Mr. McBerty told me that he was looking for a spot welded fan blade.

(Mr. Stackpole: I object to the answer as hearsay.)

Q. 10. Was such search made?
A. Yes, sir.
Q. 11. Did you take any part in the search?
A. Yes, sir, I went over into the factory with them.
Q. 12. With Mr. McBerty and the other gentleman?
A. Yes, sir.
Q. 13. What did you search for?
A. I took Mr. McBerty and the other fellow into our room where we kept all of the obsolete fans and fan parts, and dug up for them all of these parts and completed blades that were there.
Q. 14. What were they looking for?
A. A spot-welded fan.

(Mr. Stackpole: I object to the answer as incompetent and hearsay.)

Q. 15. Did this other gentleman know what they were looking for?

(Mr. Stackpole: I object to the question as incompetent.)

A. Undoubtedly.
Q. 16. To what extent was the search made, as you remember?
A. We went through all the bins, and everything that was in that room, and dug up all the fan blades and fan parts that were there, and Mr. McBerty looked them over.
Q. 17. Did the search include that place where old fans would be placed that were returned from the trade, after having been on the market?
A. All obsolete types of fans were kept in that room, both fans that came back, and parts that had never been shipped out.
Q. 18. Can you state whether a spot-welded blade was found in this search?
A. Not to my knowledge.
Q. 19. State whether or not this search was the only occasion that you went with Mr. McBerty and another gentleman to look through the factory for old fans and fan blades?
A. That is the only search I helped make personally.
Q. 20. Do you recall the name of the gentleman that was with Mr. McBerty?
A. No, I do not.
Q. 21. State whether or not this search included more than one part of the factory?
A. It included this room I have described; it included the warehouse where there were some old fans; and it included the third story of the main building where there were some more fans.

(Mr. Pattison: That is all.)

Cross-examination by MR. STACKPOLE:

X-Q. 1. Was the other fellow with Mr. McBerty a lawyer, who was investigating the alleged spot-welding?

A. I can not tell you whether he was a lawyer or not. He was the man that came there with Mr. McBerty in the interest of this same proposition.

X-Q. 2. That was in the fall of 1913?

A. I would not say definitely in regard to that. I would say it was five (5) or six (6) years ago, in that neighborhood.

X-Q. 3. Was the other fellow's name Thomas Howe?

A. I don't know, sir.

X-Q. 4. In this search did you find any fans with steel blades?

A. Mr. McBerty inspected all of that stuff himself. I don't know what we dug up for him, I can not say.

(Mr. Stackpole: That is all.)

Certificate and signature waived by consent of counsel.

F. P. McBERTY.

F. P. McBERTY, a witness, who has previously testified in this case, being recalled in behalf of the defendant, testifies as follows in response to questions by MR. PATTISON:

Direct examination by MR. PATTISON:

Question 1. Are you the F. P. McBerty who testified in this case in Detroit before Judge Killitts, about some early spot welding that you did?

Answer. Yes, sir.

Q. 2. I believe you know Mr. Thomas Howe who has testified in behalf of the plaintiff in this case?

A. Yes, sir.

Q. 3. When did you meet him?

A. I met him in the fall of 1913.

Q. 4. What was the occasion of your meeting Mr. Howe?

A. Mr. Howe came to Warren to assist in collecting evidence in reference to the use of electric spot-welding machines.

Q. 5. What, in a general way, did Mr. Howe do in the way of investigating this question of spot-welding?

A. Mr. Howe went with me to different places to meet men formerly employed where the spot-welder was used. He also went with me to the plant of The Peerless Electric Company to assist in a search for any spot-welded fan blades we could locate.

Q. 6. You testified in this case at Detroit, and among other

things, you said, that you spot-welded a number of complete fan blades at The Warren Electric & Specialty Company, of Warren, Ohio, in 1901, which passed through that factory, and were put on completed electric desk fans that went out to the trade. Did you tell Mr. Howe about this when he was with you investigating the subject in 1913?

A. I did.

(Mr. Stackpole: This line of examination is objected to, if it is to impeach the testimony of this witness whose testimony has already been given.)

(Mr. Pattison: This witness has already testified that he had told Mr. Howe of these facts in 1913.)

Q. 7. What, if anything, was done by either you or Mr. Howe, or both, to obtain some tangible evidence of the making of the blades and putting them on completed fans that went to the market?

A. Mr. Howe and I went to the plant of The Peerless Electric Company, successors of The Warren Electric & Specialty Company, and made as detailed a search as we could possibly do, with a view of locating either a fan with spot-welded blades, that is a completed motor, and failing in that, to locate a spot-welded fan blade itself independent of the motor. This was done by going over the stock of old fans that had been sent out to the trade by The Warren Electric & Specialty Company and later returned for any reason whatever; and also by searching through numbers of trays which were filled with fan blades of various kinds and shapes that were in stock at the plant of The Peerless Electric Company, such fan blades being carried from year to year to replace blades that had been destroyed or lost.

Q. 8. Who was present during this search?

A. Mr. J. B. Esterbrook and Mr. Thomas Howe.

Q. 9. What was the reason for looking among the returned fans that had been out to the trade and come back to The Warren Electric & Specialty Company for some reason?

A. Mr. Esterbrook advised me that, in years prior to the date of this search, they had disposed of practically all the fans they had in the plant, and consequently any fan blades, or any blades that were spot-welded, would have gone out on the market; and our only chance of locating such a fan, he considered, would be found among the so-called second-hand or returned fans.

(Mr. Stackpole: I object to the answer as being hearsay.)

Q. 10. Did Mr. Howe understand the object of this search?

A. He certainly did.

Q. 16. Did he understand why you were looking among the second-hand or returned fans?

A. Yes, sir.

Q. 17. What did he understand about this?

(Mr. Stackpole: I object to the question as being incompetent.)

A. That was the only chance—That was our best chance to find a blade of this type—That our best chance to find a blade of this type would be to find it among some of the fans that had been sold by The Warren Electric & Specialty Company, and later on returned.

Q. 18. Was a spot-welded fan blade found on the occasion of this search?

A. No. We were unable to find any spot-welded fan.

Q. 19. What was Mr. Howe's attitude in respect to this matter?

(Mr. Stackpole: I object to the question as being incompetent.)

A. Mr. Howe's attitude was that it would be advantageous evidence if we could locate such a fan blade, as a positive demonstration of the prior use of spot-welding.

Q. 20. What were you endeavoring to establish for Mr. Howe, in making this search?

A. I wanted to prove to Mr. Howe that the fan blades had been spot-welded and sent out as a commercial product; and to secure sample of a completed specimen of a spot-welded blade, if possible.

Q. 21. You mean an original spot-welded blade that had been sent out to the trade and returned?

A. One of the original spot-welded blades that had been made in 1901, and had been sent out during that time, or about that time.

Q. 22. During your testimony in Detroit an affidavit was made by you in 1913, and drawn up by Mr. Howe, and offered in evidence on behalf of the plaintiff. State why, if you know, this affidavit makes no mention of the making of several spot-welded fan blades in 1901, which went through the factory and went out to the trade?

A. This affidavit, mentioned, was made to Mr. Howe after we had made a very thorough search for a completed blade that was welded in 1901. And Mr. Howe's suggestion was, that unless we had some positive, tangible evidence of such work having been done, that is, unless we could locate a blade and positively identify it as having been made at that time, it would be better policy to merely confine ourselves to a statement of the spot-welding done, and the sample we had, which was tangible.

Q. 23. You mean confine yourselves to the specimens that were attached to your affidavits?

A. Yes, attached to the affidavits already in hand.

Q. 24. If it had been that you did not tell Mr. Howe about

making a number of spot-welded fan blades, and sending them out to the trade, what possible reason could there have been for the search that you and he made at The Peerless Electric Company?

A. Absolutely no reason at all. The only desire was to locate a spot-welded fan blade.

Q. 25. What was the character of the interview that Mr. Howe had, in 1913, with Mr. John McDonald, who has testified for defendant in this case?

(Mr. Stackpole: I object to the question, as not calling for facts, and as being incompetent.)

A. His interview, so far as securing evidence in reference to this spot-welding, was very brief, and, in my judgment, unsatisfactory.

Q. 26. Did Mr. Howe on this visit ask Mr. McDonald to think the matter over and recall all that he possibly could, and that he would call to see him again?

A. No, he did not.

Q. 27. Did he, so far as you know, call upon Mr. McDonald again?

A. I never knew of his seeing Mr. McDonald other than that one time, until he saw him in Detroit recently.

Q. 28. About how much time was spent in this interview with John McDonald in 1913, in respect to this spot-welding proposition, and the electric welder?

A. The interview, in reference to the use of the electrical welder, and spot-welded blades, would not cover a period of more than three (3) to five (5) minutes all told. It was very brief.

Q. 29. What was Mr. McDonald's occupation at that time?

A. A farmer.

Q. 30. Was this an unexpected call on Mr. McDonald?

A. Yes, sir.

Q. 31. Had he been given any opportunity to try to recall or remember any of the facts about this spot-welding proposition?

A. No, sir, not at all.

Q. 32. I believe you are acquainted with John Gilder, who has testified in this case for the defendants?

A. Yes, sir.

Q. 33. Mr. Gilder and Mr. Howe have testified that Gilder was interviewed in 1913 by Mr. Howe in respect to this spot-welding proposition. Were you present during this interview?

A. I was present at one interview, to my knowledge.

Q. 34. About how long would you say that this interview lasted altogether?

A. My recollection would be, it lasted ten or fifteen minutes.

Q. 35. Had Mr. Gilder been given any previous opportunity to think about this early welding proposition before the interview?

A. Not to my knowledge.

Q. 36. When Mr. Howe was in Warren in 1913, investigating

this early spot-welding of yours, did you recall at that time that any catalogue of The Warren Electric & Specialty Company disclosed a fan with a spot-welded blade thereon?

A. No, I did not.

Q. 37. Did Mr. Howe suggest looking for any of the catalogues of The Warren Electric & Specialty Company, or The Peerless Electric Company, in this connection?

A. No, he did not.

Q. 38. Or about an examination of any other trade publications?

A. No, he did not.

Q. 39. How did you happen to discover The Warren Electric & Specialty Company's catalogue of 1901, with the illustrations of the G-2 fans, which you say are spot-welded?

A. This was brought about by request made by Mr. Pattison regarding catalogues and methods of advertising these fans and describing same.

Q. 40. Was there any search made in response to this request of Mr. Pattison's?

A. Yes. Immediately after the suggestion was made that there might be catalogues available, or at least it would be policy to search for such catalogues and descriptive matter, I went to the plant of The Peerless Electric Company, successors of the Warren Electric & Specialty Company, and asked their Mr. W. C. Ward, Manager of The Peerless Electric Company, whether there were any of the old catalogues still in existence illustrating the line of fans produced in 1900, 1901 and 1902.

Q. 41. What was the result of this search?

A. Mr. Ward very promptly advised me that such catalogues were in existence, and searching in the drawer of his desk, he handed me a 1901 catalogue, which gave a detailed description and cuts of the various types of fans manufactured by The Warren Electric & Specialty Company in 1901 and placed on the market at that time.

Q. 42. Were these catalogues available in 1913, when Mr. Howe was in Warren?

A. Yes, sir, they were.

(Mr. Pattison: Opposing counsel is asked whether any affidavits were called for during Mr. McBerty's testimony in Detroit, that he now wishes to be produced. If there are any in existence counsel for defendant will be very glad to produce them for opposing counsel.)

(Mr. Stackpole: The record will show whether any affidavits were asked for. The affidavits of Messrs. McBerty, Brown, Lipps, and others are already in the case, and seem sufficient.)

Q. 43. Are you acquainted with William B. Ensor, of Warren, Ohio.

A. Yes, sir.

Q. 44. Mr. Ensor has testified for the defendant in this case. When, and under what circumstances, did you meet Mr. Ensor?

A. I met him at the plant of The Peerless Electric Company recently, while making a search through the stock of old fans at the plant of The Peerless Electric Company.

Q. 45. What were you looking for?

A. I was endeavoring to locate a spot-welded fan blade on any returned fans that they might have in the factory or storehouse.

Q. 46. Did you find any?

A. No, I was not successful in finding any fan blade of that type.

Q. 47. What, if anything, did you learn at that time regarding spot-welded fans?

(Mr. Stackpole: I object to the question as calling for hearsay.)

A. I explained to Mr. Ensor the particular type of fan blade I was endeavoring to locate, and I was advised by him that, shortly after he became connected with The Peerless Electric Company, which was in 1911, that he saw such a fan blade on an old fan motor that had been returned; and owing to the peculiar construction of the blade, which was a blade without rivets, it attracted his attention; and he examined it quite thoroughly.

(Mr. Stackpole: What Mr. Ensor told the witness is objected to as hearsay.)

Q. 48. Were you the first one that Mr. Ensor told this to?

(Mr. Stackpole: I object to the question as incompetent.)

A. Mr. Ensor had taken this matter up also with the former chief engineer of The Peerless Electric Company.

(Mr. Stackpole: I object to the answer as being hearsay.)

Q. 49. What was his name?

A. Theodore Kargeau.

Q. 50. Did Mr. Ensor tell anyone else besides Kargeau before he told you?

A. I believe he also mentioned this matter to Mr. Hadly.

(Mr. Stackpole: I object to the answer as being hearsay.)

Q. 51. To anybody else?

A. Not to my knowledge. I made a misstatement right there.

Q. 52. If you have any correction to make in your answer, please do so.

A. He also told Newton A. Smith, the representative of The Thomson Spot Welder Company.

Q. 53. He told Mr. Smith before he told you?

(Mr. Stackpole: I object to the question on the ground it is incompetent and hearsay.)

A. He did.

Q. 54. During this occasion with Mr. Ensor, was an effort made to find this spot-welded blade?

A. Yes. After Mr. Ensor told me of this spot-welded blade that he had seen there, we made a very thorough search for it; thinking possibly it might still be at the plant of The Peerless Electric Company somewhere.

Q. 55. About when was this last search with Mr. Ensor, to which you referred?

A. In the month of June or July, 1919.

Q. 56. Have any efforts been made to locate Theodore Kargeau?

A. Yes, I have done practically everything I could to locate Mr. Kargeau. I telegraphed to the last known residence place of Mr. Kargeau, and I telegraphed to the postmaster at that town regarding his present whereabouts; and I have also telegraphed to parties who might possibly have some knowledge of his present whereabouts; but have been unable to locate him.

Q. 57. Mr. Thomas Howe, in answer to question 7, intimates that in 1913 he took to Warren a specimen spot-welded fan blade, that had reached Mr. Edwards through your attorney, Mr. McGill. Did he show you that specimen when he was investigating the question in 1913 in Warren?

A. Not to my knowledge.

Q. 58. Mr. Howe, in answer to question 11, gives the impression that you never told him of making more than one complete fan blade; and didn't tell him any spot-welded blades were assembled in complete desk fans that went out to the trade. Have you anything to say about this?

A. Mr. Howe's memory, in connection with this matter, is not good; as that was gone over very thoroughly, in detail the prior work that had been done on spot-welded blades. And his final judgment was, we should confine our testimony in reference to this spot-welding on actual samples we had on hand.

Q. 59. Mr. Howe says that when he was here in 1913, you didn't give him the name of William E. Smith as a former employee, who might know about the welder and work done on it. What is your recollection about that?

A. My impression in connection with this is, that we were at that time interested in workmen only connected with the fan motor department; and Mr. William E. Smith was directly connected with

the transformer department, and didn't get on the list of fan motor operators or producers, and was therefore overlooked.

Q. 60. About when, if you remember, and how, if you remember, did you learn that Mr. William E. Smith did know something about this spot-welding proposition?

A. This was brought to my attention, I think, two or three years ago, owing to the fact that some of the men I had talked with in connection with the spot-welding remembered that Mr. Smith had, at various times, worked in the fan motor department. And on inquiry of Mr. Smith, I found he was quite familiar with the entire process.

Q. 61. In answer to question 20, Mr. Howe says your welder in 1913 was incomplete in many respects. Have you anything to say about this?

A. The welder was complete in every detail, with the exception that I did not have the original spot-welder electrodes that I had used; and the machine was not mounted on a pedestal or base to permit its being operated. Otherwise, it was in the identical condition it is today.

Q. 62. Did Mr. Howe ask you to assemble the machine and operate it for him?

A. No, he did not.

Q. 63. Did he manifest any interest in seeing it operate?

A. No, he did not.

Q. 64. Mr. Gravell, a witness for the plaintiff, has testified in regard to the character of the spot welds on the fan blade that you spot-welded on your old machine at the Ford plant in the presence of Judge Killitts; and he calls attention to the fact that some of the welds on that exhibit (Defendant's Exhibit 56) stand obliquely in the metal. Have you anything to say in respect to this?

A. The demonstration, made at the plant of the Ford Company on this welder, was not made with a view of making as nice and as workmanlike a job as could be done; it was merely to demonstrate that the machine would spot-weld, and had ample capacity to do this work. And all that would have been necessary to make a perfect job would have been to dress up the points to the proper shape, and it would have made as satisfactory a weld as could be made with any spot-welder.

Q. 65. In spot-welding commercially, with the modern spot-welders of today, are all of the spots, of the series, which may be made on one piece of work exactly the same?

A. They are not. They vary, depending entirely on the amount of pressure applied, and the length of time the current is kept on.

Q. 66. What effect does the repeated use of the electrodes have on the appearance of the work?

A. The repeated use of the electrodes have a tendency to make it cup-shaped; has a tendency to press up around the outside edge of the electrodes, making a rougher weld.

Q. 67. Will the deepest part of the recess, made by the electrodes, be always in the center of the weld?

A. Not always. It depends entirely on how the work is held in position.

Q. 68. What is the result, in modern, commercial welding, spot-welding, so far as any oblique appearance of the welds is concerned?

A. The majority of the spot-welding work done has a projection on one side or the other of the welds, on the face of the sheets. The heat of the metal has a tendency to force up the metal around the welded point.

Q. 69. The witness Wagner for the plaintiff calls attention to the fact that The Warren Electric & Specialty Company's catalogue for 1901 (Defendant's Exhibit 2) does not describe that the blades of any of the fans are copper or nickel plate; but that it does state "other finishes if specified." What does "other finishes if specified" mean in this catalogue?

A. The standard finish on the high grade fans is brass, polished and lacquered; but the company stood at all times prepared to furnish copper-coated, oxidized, and nickel-plated fan blades, and other metal trimmings, upon request from the customer.

Q. 70. Mr. Edwards, a witness for the plaintiff, was attorney for the defendant in the Barney & Berry case, frequently referred to herein, and in answer to question 12 in this case, he gives the impression that it was at your initiative that he asked you in the Barney & Berry case, about your spot-welding, which you were not permitted to state at that trial. What have you to say about this?

A. Apparently Mr. Edwards' memory does not serve him well in this particular instance. I was telegraphed to to come to Boston immediately. In other words, urged to make haste. I went down there with a view of assisting them, by supplying any information available, but not with the intention or understanding I was to be called to the stand at all on that case, as I had not been prepared in any way, and knew nothing about how the case was to be handled.

Q. 71. How long prior to the trial was it you received this telegram—How long prior to the trial of The Barney & Berry case, was it you received this telegram?

A. My impression is that Mr. Frank Warren telegraphed to me on the last day of March, to be in Boston on the 1st day of April, or the following day, prepared to attend this case.

Q. 72. Did you request that you be called as a witness in The Barney & Berry case?

A. No.

Q. 73. Did you request that you be asked about your spot-welding in the Barney & Berry case?

A. No. I had no intention of being called to the stand.

Q. 74. Did you have anything with you at all relating to your prior spot-welding?

A. No.

Q. 75. In answer to question 11, Mr. Edwards says, that he had a conference with you, after the affidavits were obtained by Mr.

Howe, and that you told him (Mr. Edwards) that none of your spot-welded blades were put into use, or went out commercially. How about this?

A. I believe Mr. Edwards' memory fails him there again. I gave Mr. Edwards all the information I had given Mr. Howe, as well as what Mr. Howe had told him regarding prior use. And he also knew, I am quite confident, regarding our search for that spot-welded fan blade.

Q. 76. Did you tell him that the spot-welded fan blades were not adopted as a regular manufacturing proposition at The Warren Electric & Specialty Company's plant?

A. Yes, I told him that.

Q. 77. Plaintiff's witness, Curtiss Brewer, has testified in this case, in answer to question 50, that the fan blades, that The Warren Electric & Specialty Company used were received from an outside firm, with the rivet holes being punched. State what you know about this during the time you were with The Warren Electric & Specialty Company, including, as I understand it, up to the time that company sold out in 1902.

A. Mr. Brewer is mistaken in reference to that statement. As I, being in charge of the designing and construction of these fans, personally saw to it that dies were made for producing fan blades when we first started to manufacture fans. And from that time on, during my entire connection with The Warren Electric & Specialty Company, we stamped out all our own fan blades, both brass and steel. To my knowledge they never purchased blades at any time from outside sources.

Q. 78. In what form did the material come to the Warren Electric & Specialty Company, out of which the blades were stamped?

A. The brass came in sheets of the proper width to cut fan blades crosswise on the sheet, and in lengths from 6 to 10 feet long in boxes. And the steel came in boxes and bundles of the same general shape, straight sheets, from which to punch the blades.

Q. 79. The same witness, in answer to question 46, says, that the blades that the Warren Electric & Specialty Company used were of iron. State what you know about this, during the time that you were with the company.

A. Some of the blades produced in 1901, and later, were all of what we call cold-rolled, machinery steel. This sheet steel all the scale had been removed, and was smooth on the outer surface, and was reasonably soft. And this steel we used in stamping out the blades for the cheap fan.

Q. 80. Were any iron blades used by The Warren Electric & Specialty Company, as distinguished from the steel to which you have just referred?

A. Not to my knowledge.

Q. 81. What kind of spiders were used on the steel blades?

A. A steel spider was also used.

Q. 82. How were these made?

A. These were also punched out of sheet steel, but it was not as high-grade sheet steel, or with as fine a finish, as the material that the blades were produced from.

Q. 83. This same witness has testified, in answer to questions 22 to 24, that your welding machine was built on a block of fibre, about 8 by 10 inches, and about an inch thick. Was your machine mounted at any time on a block of fibre?

A. It was not.

Q. 84. Was your welding machine at any time mounted on a block, or anything, that substantially corresponds to the dimensions given by the witness?

A. After the machine was taken over by The Peerless Electric Company it was supplied with a base made of slate, which I would say, was about 8 by 10 inches by fifteen-sixteenths or seven-eighths inches thick. And this slate base was with the welding machine when it was purchased by myself in 1911 from The Peerless Electric Company, and is now with the machine in Detroit in custody of the Court.

Q. 85. Was your welding machine mounted on a block of fibre, or any other kind of block, as defined by Mr. Brewer, while it was owned by The Warren Electric & Specialty Company?

A. It was not.

Q. 86. The evidence in this case shows that when The Warren Electric & Specialty Company sold out its fan department to The Peerless Electric Company in 1902, this welding machine was moved over to another building in custody of The Peerless Electric Company. State whether this slate block, to which you have referred, was used with the machine before, or after, it was moved from The Warren Electric & Specialty Company?

A. It never was used with the machine before it was moved. How long afterwards, I don't know.

Q. 87. Do I understand from this, that your welding machine was mounted on a slate block or slab after it was moved to The Peerless Electric Company in 1902?

A. Yes, it was.

Q. 88. As I understand your testimony, given in this case, the spot-welding of blades all occurred on this machine while it was with The Warren Electric & Specialty Company?

A. All done in the early part of 1901, while at the plant of The Warren Electric & Specialty Company.

Q. 89. How was your welding machine mounted at The Warren Electric & Specialty Company, prior to putting it on the slate base at The Peerless Electric Company?

A. It was built to the top of a hard-wood bench, with the bed of 2 angle irons extending out from the edge of the bench some distance.

Q. 90. State whether or not its mounting at The Warren Electric & Specialty Company is correctly represented in its present mounting in this case?

A. As near as we could duplicate the original conditions.

(Mr. Pattison: The direct examination is closed.)

Cross-examination by MR. STACKPOLE:

X-Q. 1. You say that the slate base of your welder is with the machine now in Detroit, in the same box with the machine?

A. It is my impression it is in a smaller box, which is down inside of the crate.

X-Q. 2. And that is a slab of slate 8 by 10 inches?

A. Approximately so.

X-Q. 3. And about ⅞ of an inch, or thereabouts, thick?

A. Yes.

X-Q. 4. Is the slate base cut, or carved, or plain?

A. It has a hole in the center to permit the bed of the welder to extend down through.

X-Q. 5. How big is that hole?

A. I would say it is 2½ by 8 inches.

X-Q. 6. How can you get a hole that size in a plate 8 by 10?

A. You can drill it in, or saw it in, or any other way. You have still an inch of material at each end, and considerable material out on each side.

X-Q. 7. What is the object in using slate?

A. That, I think, was done to conform to more rigid electrical specifications, which had gone into effect in the installation of electrical apparatus in later years.

X-Q. 8. What became of the specimen you say you showed Mr. Fish at the time of the trial of the Barney & Berry case?

A. That was later on turned over to Mr. J. N. McGill, and, as I understand, was in turn given to Messrs. Edwards, Sager & Wooster.

X-Q. 9. You say you showed this to Mr. Fish at the time of the Barney & Berry case, was that about March or April 1914, or 1915?

A. That was 1914. My interview with Mr. Fish, I think, was the late fall of 1912, or the early spring of 1913.

X-Q. 10. While you were recently making a search with Mr. Ensor in The Peerless Company's plant for fans, did you find any G-1 or G-2 fans?

A. I do not believe we found any of the original G-1 or G-2 fans.

X-Q. 11. What became of the statement that Mr. McDonald gave you in 1913, or thereabouts?

A. That is something that I cannot answer definitely; but my impression is that it is still among the correspondence of The National Electric Welder Company. As this statement was left at our office for Mr. McDonald to call for and sign. But he never did.

X-Q. 12. In your search in The Peerless Company's plant in 1913, did you find any G-1 or G-2 fans?

A. Yes, we found several of those old fans at that time.

X-Q. 13. So far as you know, they have since disappeared?

A. Yes, they have all been disposed of in one way or another.

X-Q. 14. Did both the old G-1 and G-2 fans have steel spiders?

A. Yes. the regular product did.

X-Q. 15. And these steel spiders were they the same shape?

A. The same shape, and the same size in both the 12 and 16 inch fans.

(Mr. Stackpole: That is all.)

Re-direct examination by MR. PATTISON:

Re-D. Q. 1. Were you asked by any one in connection with The Barney & Berry case to have your machine ready to demonstrate its operation for that case?

A. No, sir. I was not.

Re-D. Q. 2. I will ask you to state whether the G-1 fan, in the 1901 catalogue, shows a fan blade of the standard construction for that type of fan?

A. No. I would say that it did not, as the fan blade shows three (3) rivets per blade, which would indicate it had a brass center. This would not be standard production for that type and grade of fan.

Re-D. Q. 3. What is the standard production for that type and grade of fan?

A. A steel blade, with a steel center, and two (2) rivets per blade.

Re-D. Q. 4. How are these two (2) rivets located?

A. The two (2) rivets are located centrally on the blade, and about 2¼ inches apart.

Re-D. Q. 5. How were they arranged in respect to the blade, transversely, or longitudinally.

A. Longitudinally.

Re-D. Q. 6. State what kind of blade is illustrated on the G-2 type of fan in the 1901 catalogue?

A. That is a spot-welded blade, steel, with a steel center,

Re-D. Q. 7. What is the shape of the center of that blade?

A. The center has four (4) arms, attached to the steel hub, with the arms extending out from the center, and slightly tapering out to the outer end, that is more so than they are closer to the hub.

Re-D. Q. 8. State whether the spider of the blade in the cut G-2, in the 1901 catalogue, is the same shape as the spider of the fan blade which you spot-welded at the Ford plant in the presence of Judge Killitts, which I think is Defendant's Exhibit 56?

A. The spider would be the same shape identically.

Re-D. Q. 9. Is it the same size, or a different size?

A. The same size

Re-D. Q. 10. Do you mean by this that the same size steel spider was used for the G-2 and G-1 type fans?

A. Yes, it was. Never had but the one size die for stamping out steel spiders.

(Mr. Pattison: That is all.)

Re-cross-examination by MR. STACKPOLE:

Re-X-Q. 1. Besides the cut of G-2, found in the 1901 catalogue, have you any other evidence of the shape of the steel spider used in these G fans?

A. Yes, we have. The Peerless Electric Company are still using the original dies made at that time.

Re-X-Q. 2. Have you any other evidence than your recollection?

A. Samples of the spot-welding, which I have submitted in connection with my affidavit.

Re-X-Q. 3. Anything else.

A. That is all I have, to my recollection.

Re-X-Q. 4. The cuts of these fans, G-1 and G-2, bear the name "Manz, Chicago." Were the fans themselves sent to Manz of Chicago to be photographed?

A. That is something I cannot say. Sometimes we sent them out, and sometimes we had a local photographer take them.

Re-X-Q. 5. If Manz at Chicago took the photographs, would you say that the fans were sent to Chicago, or not?

A. If Manz took the photographs, I would say yes. But that mark on there indicates that Manz made the cuts, and does not indicate that he made the photographs at all.

Re- X-Q. 6. Do you know who did make the photographs?

A. I am not in a position to say.

Re-X-Q. 7. Do you know whether the photographing of the fans for this catalogue was done as one job, or some at a subsequent time or not?

A. No. I would not want to make a definite statement on that either.

(Mr. Stackpole: That is all.)

Re-direct examination by MR. PATTISON:

Re-D. Q. State whether or not Defendant's Exhibit M, which was offered during your testimony in Detroit, with your name and date on it, contains a spider of the same size and material as would be in the blade of the G-2 fan in the 1901 catalogue?

A. It does.

(Mr. Pattison: That is all.)

(Certificate and signature waived, by consent of counsel.)

(Mr. Stackpole: No cross-examination.)

Certificate and signature waived by consent of counsel.

MRS. ZELLA A. MCBERTY.

MRS. ZELLA A. MCBERTY, a witness called on behalf of defendant, having been duly sworn, testifies as follows in answer to questions by Mr. Pattison:

Direct examination by MR. PATTISON:

Question 1. Please state your name and residence.

Answer. Zella A. McBerty, 29 Washington Avenue, Warren, Ohio.

Q. 2. What is your present occupation?

A. Secretary and Treasurer of The Federal Machine and Welder Company.

Q. 3. What was your occupation prior to your connection with The Federal Machine & Welder Company?

A. Assistant Secretary and Treasurer of The National Electric Welder Company.

Q. 4. While you were with the National Company, was a Mr. Newton Smith in the employ of that company?

A. Yes.

Q. 5. What was his employment there?

A. Shop Superintendent.

Q. 6. Approximately, how long was he with The National Electric Welder Company?

A. I can not say definitely as to the exact dates; but he came in the winter and left in the early spring of 1917.

Q. 7. Did his employment cease there while you were with that company?

A. Yes.

Q. 8. What was the reason of his leaving the company?

A. Well, I would say, because he was not satisfactory.

Q. 9. Was there any complaints about him from anyone in the office of the company?

A. Yes. One of my stenographers made complaint to me that he made himself rather obnoxious, in looking over letters which she was writing, and correspondence that was laid on her desk that she was to answer for Mr. McBerty.

Q. 10. Was he caught spying around the plant?

A. I noticed Mr. Smith a couple of times looking over the mail on Mr. McBerty's desk.

Q. 11. Did you catch him at any time other than these?

A. One time at the safe. I hadn't locked it up, and I came back in the office after working hours, and he was at the safe, and had opened up the doors. And he said to me, when I came in, "You have forgotten to lock the safe." I said, "I notice I did."

Q. 12. What was the reason for this spying of Mr. Smith's in the National Company, if you know?

A. He was in the employ of The Thomson Spot-Welder Company.

Q. 13. State, if you know, what he was trying to find out at The National Company?

A. As much as I can say, he was trying to see if we had spot-welders that were not under the lease and license arrangement with The Thomson Spot-Welder Company, as per agreement with The National Company. I don't know of any other reasons, although I presume there were several, but that would be the most important to my mind.

Q. 14. Did he leave himself, or was he discharged?

A. I think he handed in his resignation to Mr. McBerty.

Q. 15. At the time he left did you regard him as a spy, sent to your place?

A. I would not say that I did. Because he had told us, when he came into our employ, that he had no connection, and knew nothing of The Thomson Spot Welder Company.

Q. 16. Were you suspicious of him prior to the time you found him in the safe?

A. No, I would not say I was. Although we certainly criticised his work, and thought there was something radically wrong, because our production was not up to standard, and we were endeavoring all we could to help it, and he did not seem to want to help as we thought he should.

Q. 17. How did you happen to find him in the safe?

A. Well, one of the girls in the office had remarked that she thought it peculiar that Mr. Smith knew the combination of the safe, as she thought I was the only one that did. She said, that one morning, I was late, and they wanted to get into the safe, and he and Mr. Johnstone, who was at that time in our employ, opened up the safe; either Mr. Smith or Mr. Johnstone, I can't say which. Then after these various things had come up, his looking at the correspondence, and such things, I was a little bit suspicious.

Q. 18. How was it that you came back to the place, after leaving the office, and found Mr. Smith in the safe?

A. Because I wanted to see what he would do under those conditions.

Q. 19 Under what conditions?

A. I had left the safe unlocked, and I said I would take the mail sack down, which was not customary; and I drove out a little ways, and turned around and came back, and went into the office quietly, and he was at the safe, and had opened the doors.

Q. 20. Did you leave the doors of the safe closed when you left?

A. Closed, but not locked.

Q. 21. When you came back you found him there with the doors open?

A. Yes, sir.

(Mr. Pattison: That is all.)

(Mr. Stackpole: I have no cross-examination. The entire deposition is objected to as being irrelevant and immaterial, and is not sur-rebuttal.)

Certificate and signature is waived by consent of counsel.

JOHN S. GILDER.

JOHN S. GILDER, a witness, who has heretofore testified in this case on behalf of the defendant, testifies as follows in answer to questions by Mr. Pattison:

Direct examination by MR. PATTISON:

Question 1. You are the John S. Gilder who testified in this case at Detroit?

Answer. Yes, sir.

Q. 2. At Detroit you testified about doing butt-welding on the McBerty welder at the factory of The Warren Electric & Specialty Company in 1901?

A. Yes, sir.

Q. 3. At the time you did this welding, state whether or not the welder was mounted on a fiber block or slab of any kind?

A. No, sir. I don't remember of anything of that kind. As I remember it was mounted right on the bench.

(Mr. Pattison: That is all.)

(Mr. Stackpole: No cross-examination.)

Certificate and signature waived by consent of counsel.

EDWARD L. BETTEKER.

EDWARD L. BETTEKER, a witness called on behalf of the defendant, having been first duly sworn, testifies as follows in answer to questions by Mr. Pattison:

Direct examination by MR. PATTISON:

Question 1. What is your name and residence?

Answer. Edward I. Betteker, Warren Township.

Q. 2. What is your present occupation?

A. Farming.

Q. 3. Were you ever employed by The Warren Electric & Specialty Company?

A. Yes, sir.

Q. 4. What was your employment there?

A. Press work, and so on.

Q. 5. Were you familiar, during your employment by The Warrent Electric & Specialty Company, with the manner of making their fan blades?

A. Well, I punched out the fan blades, I guess all that were made, that is, until they got more presses, then I supervised the work.

Q. 6. Out of what material were those fan blades made?

A. Brass, and cold-rolled sheet steel.

Q. 7. What was the color of this cold-rolled steel?

A. Well, it was bright steel, no scales, or anything like that on it.

Q. 8. Were you employed by The Warren Electric & Specialty Company at the time they sold out to The Peerless Electric Company?

A. Yes.

Q. 9. When did your employment begin with The Warren Electric & Specialty Company?

A. 1899, I believe, the day after Christmas, the 26th of December.

Q. 10. In what form did the material come to The Warren Electric & Specialty Company, the material out of which the fan blades were made?

A. Came in boxes, probably 10 or 12 feet long, in strips. Some of the strips, I believe, were 6 inches wide, for the 12-inch fan, and the other was perhaps 8 inches wide. It might have been less, but that was about the size of it.

Q. 11. State whether this material came through your department?

A. Yes. I got it from the stock room, to put through the press department.

Q. 12. Who did the press cutting of these fan blades during the years 1901 and 1902?

A. I probably did it myself at that time. I think it was about 1903 when we got more presses in there, and I didn't do so much press work myself then.

Q. 13. Did you do all the blade cutting up to 1903, when you got more presses?

A. Yes.

Q. 14. In cutting out these brass and steel blades, when the blank was first cut, was it with, or without rivet holes?

A. Without rivet holes.

Q. 15. Then the blank blade would have to have rivet holes punched through it?

A. Yes, in another operation.

Q. 16. Is it correct to say that you had one set of dies to punch out the blank blades, and another set to punch out the rivet holes?

A. Yes.

Q. 17. These two punching operations were separate operations?

A. Oh, yes.

Q. 18. Mr. Curtiss Brewer has testified in this case, that in 1901 The Warren Electric & Specialty Company bought its fan blades from an outside firm. Do you agree with that statement?

A. I never knew it, if they did.

Q. 19. In 1901, I understood you to say, that you cut out the blades that were used there?

A. I was there from 1899, and I cut them out until 1903. I did all the punch work. We only had one press, with the exception of a foot press. I think in 1903 we got more presses, and then I supervised the work.

Q. 20. And the blades were made out of this bright, cold-rolled steel?

A. Yes.

(Mr. Pattison: That is all.)

Cross-examination by MR. STACKPOLE:

X-Q. 1. Did you at that time punch the brass blades with the same dies as you punched the steel blades?

A. Yes.

X-Q. 2. The dies were the same?

A. Yes.

X-Q. 3. And the holes were punched with the same dies?

A. Yes. We had one set for punching holes, and one set for blanking—One set for the 16-inch fan, and one set for the 12-inch fan.

(Mr. Stackpole: That is all.)

Re-direct examination by MR. PATTISON:

Re-D. Q. 1. What kind of centers were used with the steel blades?

A. I think we punched that out of 14 gauge steel.

Re-D. Q. 2. How many rivets did that have?

A. Had 8 holes; two holes in an arm, and a hole in the center.

Re-D. Q. 3. Were there any fan blade centers, made by The Warren Electric & Specialty Company, that had different steel centers?

A. They were the same.

Re-D. Q. 4. How about the brass centers?

A. They were the same; unless the first ones we made had three holes, that was the only change. I am speaking about the two (2) hole blades.

Re-D. Q. 5. Then you had a different die for the spiders that had three (3) holes?

A. No. The spider that had three (3) holes was the one we used for the first two or three years; and then we changed over to an iron spider having eight (8) holes, two (2) in each arm, and one in the center.

Re-D. Q. 6. In the steel spider you had two (2) rivet holes?
A. Yes.

(Mr. Pattison: That is all.)

(Mr. Stackpole: That is all.)

Certificate and signature waived by consent of counsel.

(Mr. Pattison: Notice is hereby given that the record and briefs used in the Court of Appeals, in The Barney & Berry suit, will be handed to the Court, and referred to by defendant at the hearing.)

Adjourned to Findlay, Ohio, at the office of Messrs. Snyder & VanCampin, at 11 o'clock A.M., July 25, 1919.

IN THE DISTRICT COURT OF THE UNITED STATES

EASTERN DISTRICT OF MICHIGAN, SOUTHERN DIVISION

No. ———.

THOMSON SPOT WELDER COMPANY, Plaintiff,

vs.

FORD MOTOR COMPANY, Defendant.

Pursuant to agreement, counsel met at Findlay, Ohio, July 25, 1919.

Present: J. L. STACKPOLE, of counsel for plaintiff, and
A. S. PATTISON, counsel for defendant.

JASPER W. POWERS.

JASPER W. POWERS, a witness called on behalf of the defendant, having been duly sworn in this case, testified as follows:

Direct examination by MR. PATTISON:

Question 1. Please state your name and residence.
Answer. Jasper W. Powers: Findlay, Ohio.
Q. 2. What is your present employment?
A. Superintendent of the Star Tractor Company.
Q. 3. Are you the Jasper W. Powers who testified in this case at Detroit before Judge Killitts?

A. I am.

Q. 4. At Detroit you testified about making parts of an electric welding machine, testified to by Mr. McBerty. I supposed you had been asked about all the work you did on that machine, but on examining the record I have failed to find that you testified whether you had any knowledge about the electrodes that were said to be used in that machine. Did you have any such knowledge?

A. I did.

Q. 5. What do you know about the making of electrodes for use in that machine?

A. Are you speaking of the blocks that—you mean the electrodes that were used in the spot welding?

Q. 6. Yes.

A. I made one or more pairs.

Q. 7. What was the shape of these electrodes?

A. They were round copper wire, what we would call hard-drawn copper wire.

Q. 8. How thick?—by Mr. Stackpole.

A. It was heavier than a quarter inch, and as I remember, it was about five-sixteenths.

Q. 9. How about the ends of these?

A. To describe that more fully, I will say it was larger than a fan guard rim or ring.

Q. 10. How about the shape of the ends of these electrodes?

A. They were slightly pointed, conical shaped.

Q. 11. When, as you remember, did you make these electrodes in reference to the time you did the work on the machine?

A. It was along about the same time; it was after the machine was in operation on butt welding.

Q. 12. You also testified to a conference between yourself and Mr. McBerty and Mr. Gillmer to determine whether the spot-welded blade should be adopted in place of riveted. State whether you did the work on these electrodes after or before this conference?

A. The work on the electrodes was before the conference.

Q. 13. Have you any reason for stating why these electrodes were made before the conference to which you refer?

A. At the time we did the spot welding, and considered using it as a manufacturing process for that season, or on that fan, I had a great many parts made up and all my fixtures were made for riveted blades. I don't know that I recall clearly anything else in connection with it except the early season, the early part of the season was when we were getting our parts out and I had those parts all made up, and argued in the conference against using the spot-welding.

Q. 14. You mean this argument occurred early in the season of 1901?

A. Yes.

Q. 15. And it was before this time that you made the electrodes to which you referred?
A. It was.

Cross-examination by MR. STACKPOLE:

X-Q. 16. You remember making any bent electrodes?
A. I do not.

Signature and certificate waived by agreement of counsel.

DISTRICT COURT OF THE UNITED STATES

EASTERN DISTRICT OF MICHIGAN.

SOUTHERN DIVISION

Harmatta Patent No. 1,046,066.

In Equity, No. ———

THOMPSON SPOT WELDER COMPANY, *Plaintiff*,
vs.
FORD MOTOR COMPANY, Defendant.

Evidence taken on behalf of the defendant under the Revised Statutes of the United States and the Equity Rules of the Supreme Court of the United States, in accordance with stipulations heretofore entered into by counsel for the respective parties and pursuant to the annexed notice, before me, the undersigned Notary Public in and for the County of Wayne, State of Michigan.

EDWARD T. JEAN,
(Seal) *Notary Public.*
My Commission expires March 31, 1923.

The parties met pursuant to the annexed notice at the office of Messrs. Barthel, Flanders & Barthel, 408-414 Buhl Block, 35 W. Congress Street, Detroit, Michigan, on the 24th day of July, 1919, at 10 o'clock A. M.

Present: Otto F. Barthel, of counsel for defendant.
William S. McDowell, of counsel for plaintiff, specially appearing for plaintiff for purpose of making objections to be hereafter stated.

It is stipulated that for convenience of counsel and the witnesses to be examined, the taking of testimony herein is adjourned to the office of O. J. Beaudette and Company, Pontiac, Michigan.

Parties met at the office of O. J. Beaudette and Co., Pontiac, Michigan. Present, as before, and the taking of testimony was commenced at 2.30 o'clock P. M., July 24th, 1919.

(William S. McDowell, associated with Stevenson, Carpenter, Butzel & Backus, attorneys for plaintiff, object to the taking of the testimony at this time for the reason that J. L. Stackpole of Boston, attorney in charge of this case for the plaintiff is this day engaged in the taking of the testimony in the same matter at the office of the Federal Electric Welding Company at Warren, Ohio, on the part of the plaintiff and that local counsel have not sufficient knowledge of the issues involved to properly conduct cross examination. Further, counsel for plaintiff objects that the taking of testimony at this time is improper, and should not be considered by reason of the fact that plaintiff's testimony is being taken simultaneously at Warren, Ohio, in said cause, and by reason thereof plaintiff cannot be represented at the hearing now about to be had. Counsel for plaintiff therefore moves that any testimony taken during the time that the testimony is being taken at another place in the same case should not be received as a part of the record in this case.)

(By Mr. Barthel: In view of the fact that it is my understanding that this case is set for trial July 31st, and as the time is drawing to a close in which to put in defendant's proof, it is necessary to take the testimony of these witnesses at this time, and the further fact that complainant has been represented in this cause by at least three or four different counsel who have conducted the examination of witnesses, it is not seen why it is particularly necessary that Mr. Stackpole should examine these witnesses.)

(Counsel for defendant gives notice on the record that in addition to the witnesses named he will examine:

Frank E. Mills, Assistant Manager of O. J. Beaudette and Co., Pontiac, Michigan.

M. L. Evely, Superintendent of O. J. Beaudette and Co., Pontiac Michigan.

A. W. Neeland, and J. G. Wright, both employes of O. J. Beaudette and Co., Pontiac, Michigan.)

A. W. Neeland.

A. W. Neeland, being duly sworn, deposes and says in answer to interrogatories propounded to him by Mr. O. F. Barthel, as follows, to wit:

Direct examination.

Question 1. What is your name, age, residence and occupation?

Answer. Andrew Winton Neeland; age 32; residence 262 South Paddock Avenue, Pontiac, Mich.; occupation, spot welder.

Q. 2. Where are you occupied as spot welder?

A. At the O. J. Beaudette Body Company, Pontiac Mich.

Q. 3. What kind of spot welding work do you do?

A. Most of it is on touring car rear seats; occasionally on other work—roadsters.

Q. 4. How long have you been engaged in this spot welding work?

A. Since October—1912.

Q. 5. How do you fix this date of October, 1912?

A. That is the time I first began welding; first welding I ever did, and I came here to do that work; promised to do that work when I came in. I had worked here previous to that time, but the shop shut down and I went to my old home, and every year they have a celebration on the Saturday nearest the 24th of August—and I came back directly after that, the Monday following, I came to the shop and they were not ready to start yet, so I went out on the farm and worked six weeks.

Q. 6. And was it immediately after that you started your work with the O. J. Beaudette and Company?

A. Yes—they sent for me while I was there.

Q. 7. For what car was this welding work done of which you speak?

A. For touring car.

Q. 8. Was that work which you did in October, 1912, for Ford touring cars?

A. Yes.

Q. 9. About how many of these per day were made when you started in October 1912?

A. We made about fifty per day for the first, probably ten days. Had some trouble getting fifty for the first day or two.

Q. 10. And about how many did you run your production up to within say the first thirty days?

A. Probably three hundred a day.

Q. 11. How were these spot welded?

A. Well, the seat was pressed in five pieces with a bead on each seat, and these beads were lapped over and the welds placed between two and three inches apart—along the bead.

Q. 12. How were these welds made?

A. The seat was placed back up on a post and welding was made by bringing the top die down on the work.

Q. 13. By post and die, do you mean contacts, or electrodes?

A. Yes.

Q. 14. About what time in October do you estimate that you started to work?

A. Probably the tenth; wouldn't be far from the tenth.

Q. 15. How were you paid for this work at this time?

A. Was paid by the day—for the first four or five weeks or maybe six weeks—don't just remember.

Q. 16. How were you paid after that?

A. By the piece.

Q. 17. What determined the change in rate of pay?

A. Production.

Q. 18. That is, when production got up to a certain amount, you changed from day work to piece work?

A. Yes.

Q. 19. The spot welders were set up in the shop ready for use when you came here?

A. One.

Q. 20. You have been working for O. J. Beaudette & Co from the time you started in October, 1912, up to the present time?

A. Nearly all the time. Last summer I was off for about four months. They were not putting out any touring cars then. They shut down about the middle of August and do not know just when they started touring cars again but they were running them again when I came back in the middle of December. You understand I worked for them before I began spot welding. The first work I did was in April, 1911—the summer of 1912 I was away.

Q. 21. And this is how you remember that you started to do spot welding in October, 1912—is that it?

A. You asked me if I had been here ever since 1912, and I said I had worked here before that.

Q. 22. But do you remember positively that you started to do spot welding on Ford bodies in October, 1912?

A. Yes, as I stated.

Cross-examination by MR. MCDOWELL:

(Having objected to the taking of this deposition, reserve whatever right of examination we may have to such further time as may be determined.)

Signature waived by consent of counsel.

J. G. WRIGHT.

J. G. WRIGHT, being duly sworn, deposes and says in answer to interrogatories propounded to him by MR. BARTHEL, as follows, to wit:

Direct Examination.

Question 1. What is your name, age, residence and occupation?
Answer. James Gilbert Wright; age 45; residence 45 Henderson

Ave., Pontiac, Mich.; occupation spot welder, O. J. Beaudette & Co., Pontiac, Mich.

Q. 2. Where are you engaged as spot welder?

A. O. J. Beaudette & Co., Pontiac, Mich.

Q. 3. How long have you been in their employ?

A. Ten years—came the last of May, along about the 20th of the year 1909. Am not sure about the exact day.

Q. 4. How long have you been doing spot welding?

A. Since October, 1912.

Q. 5. What kind of spot welding work was this that you did in 1912?

A. Ford touring car. Rear seats; also some town car tops.

Q. 6. How did you happen to be doing this work at the plant of O. J. Beaudette & Co., Pontiac, Mich., at this time?

A. I had been here for two years, or something like that. Had been on the beader, and we made seats all in one piece, and then a change was made and they were pressed out into five pieces. Thru the summer I had been in New York State until the latter part of June. There were five or six of us making up bending strips all summer. I was one of the oldest men in the metal room, so when they got spot welders they did away with the order job and so I was changed immediately to the spot welding job.

Q. 7. How long before October, 1912, did you see these spot welders at the plant of O. J. Beaudette & Co., Pontiac, Mich.

A. I cannot say. I remember when the first one was there. It stood by the door quite a little while, then they moved it down near where the water fountain is now, and it stayed there, and then it was set up and used for welding town car tops. Then I think Mr. Buffington was there for a week or two welding town car tops, and then when they got the presses in shape. Mr. Neeland came in, and they put us on spot welding. This was sometime in October.

Q. 8. And have you been doing spot welding work ever since on Ford car bodies and tops?

A. Yes. Except sixteen days last summer.

Q. 9. Were these bodies the regulation Ford commercial automobile bodies?

A. They were.

Q. 10. That is, the touring car bodies?

A. Yes—and roadster bodies also.

Q. 11. About how many of these per day were gotten out by you and Mr. Neeland during October, 1912?

A. Well, that is pretty hard to say. We started in somewhere about fifty (50) and of course increased as fast as we could. It was right around Fall, just before election, that Mr. MacGuire sent me after a gentleman by the name of Mr. Viola who is working here at the present time, and it was just about two weeks after he came that we started on two machines, and we had had one machine in operation I should say nearly a month.

Q. 12. How many a day did you get out when they got the second machine?

A. Right around 300.

Q. 13. How were these bodies spot welded?

A. Well, the body came to us in five pieces with a two piece over-lap and the welds were spotted about two and one-half to three inches.

Q. 14. How did the electrodes contact with the over-lapped beads?

A. There was a pointed die on the bottom which is stationary and the top die is flat, about one and one-half inches in diameter, and we worked the top die by hand-lever—on one machine we used the hand lever and on one the foot tread.

Q. 15. When these dies came together, what did they do?

A. Most generally weld.

Q. 16. Is this what you call spot welding?

A. Yes.

Q. 17. Do I understand these welding spots are spaced apart along the bead?

A. Yes, spaced along the bead; from two to three inches.

Q. 18. For whom were these automobile bodies made?

A. For whom were the made?

Q. 19. Yes—by the O. J. Beaudette Co. of Pontiac, Mich.?

A. Ford Motor Company.

Q. 20. And have you been making automobile bodies for the Ford Motor Co. ever since?

A. Yes—I have been, excepting sixteen days I worked over to the General Motor Co. last fall.

Q. 21. Are you quite positive that you did spot welding work on Ford Automobile bodies in October, 1912?

A. I am.

Q. 22. And were these the regular standard product for the Ford Motor Co.?

A. They were.

Cross-examination by MR. MCDOWELL:

(Having objected to the taking of testimony at this time, reserve right to cross-examine witness as to matters testified to in said examination until such further time as may be determined.)

Signature waived by consent of counsel.

FRANK E. MILLS.

FRANK E. MILLS, being duly sworn, deposes and says in answer to interrogatories propounded to him by MR. O. F. BARTHEL, as follows, to wit:

Direct Examination.

Question 1. What is your name, age, residence and occupation?

Answer. Frank E. Mills; age 38; residence 228 Orchard Lake Ave., Pontiac, Mich.; occupation Assistant Manager, O. J. Beaudette & Co., Pontiac, Michigan.

Q. 2. How long have you been engaged with said company?

A. Since 1901.

Q. 3. What product does said Company make?

A. Automobile bodies.

Q. 4. For what companies?

A. At the present time, only the Ford Motor Co.

Q. 5. How long have you been making bodies for the Ford Motor Co.?

A. Since 1907.

Q. 6. Have you missed any years since that time?

A. None.

Q. 7. What is your work in connection with the making of these bodies?

A. I have always figured and estimated the cost of the bodies.

Q. 8. And in connection with the estimating of costs, for bodies, are you furnished with any data from which to make these estimates?

A. Yes.

Q. 9. I hand you herewith a blue print and would ask you if you have ever seen this print or a copy thereof in connection with any of your estimating work?

A. Yes, this is the construction of body I remember well.

Q. 10. For what model car was this body, if you recollect?

A. 1913 Model.

Q. 11. How is it that you remember this body well?

A. I recollect a few weak points that developed after we started to get and after we got same out.

Q. 12. About when was this body submitted to you for estimating?

A. In the summer of 1912.

Q. 13. I notice this drawing is dated June 21st, 1912. Would you say that it was shortly after this time?

A. Shortly after this time, I should say it was.

Q. 14. Is there anything else which enables you to remember this particular type of body well?

A. Yes, that is the first body we ever did any spot welding on.

Q. 15. Does this drawing show that?

A. It shows it here and here and here—(witness points to beads on drawing or blue-print—marked "X" in pencil).

(Counsel for defendant requests that the blue print referred to by the witness be marked for purposes of identification "Blue Print Ford Touring Car—Spot Welded Body.")

Q. 15. You state that this body was for the 1913 model? Now, do you know when the season begins?

A. For the different models?

Q. 17. For the different models? Each year?

A. It is supposed to begin August first.

Q. 18. What year?

A. For the preceding year—that is when it is supposed to begin.

Q. 19. That would be August 1st, 1912?

A. August 1st, 1912, yes.

Q. 20. So that in the summer of 1912 you began to get ready for the 1913 model, is that correct?

A. Yes.

Q. 21. About when were the spot welders secured for this job?

A. Between July and November or December of 1912.

Q. 22. And about what time did you begin getting up material for these jobs?

A. About in August or September—probably.

Q. 23. I hand you herewith memorandum sheet dated August 31, 1912, and would ask you what this is?

A. This is a list of metal that we used on the 1913 touring car for the Ford Motor Company.

Q. 24. Does that show the particular parts of the job which were cut up and spot welded?

A. Yes.

Q. 25. Will you mark them with pencil?

(Witness does so, marking same with the letter 'X'.)

Q. 26. Is this one of the original lists of your company?

A. Yes.

(Counsel for defendant offers in evidence list referred to by witness and instructs Notary to mark same "Defendants Exhibit Metal List for 1913 Touring Car."

Q. 27. About when did you go into production on these spot welded bodies?

A. In October, 1912.

Q. 28. And did you see some of these bodies welded at that time?

A. I did.

Q. 29. How were they welded?

A. Spot welded.

Q. 30. At what points?

A. Along the bead from two to three inches—the full length of the bead.

Q. 31. By bead what do you mean?

A. That is the pressed-out part—half oval shape.

Q. 32. And do these parts overlap each other?

A. The beads overlap each other, welded on the piece.

Q. 33. And these bodies were regular standard production of the Ford Motor Company at that time, were they?

A. They were.

Q. 34. Have you any record which would show when this spot welding work was done?

A. Yes.

Q. 35. Will you produce it?

A. Yes—the Superintendent's book.

Q. 36. Is he here in the shop?

A. He is—yes.

Q. 37. Have you looked up to find the records of the Company in reference to this Ford body work?

A. Tried hard to look them up.

Q. 38. And did you succeed in finding the records?

A. No.

Q. 39. What became of them?

A. They were destroyed in the Spring of 1917.

Q. 40. How did it happen that they were destroyed?

A. They were placed in a vault at the east end of the factory where our office formerly was and during a heavy rain, or thaw, in the Spring of 1917 they were destroyed thru water getting into the vault—destroying all papers that were in there.

Cross-examination by MR. MCDOWELL:

(Having objected to the taking to the testimony at this time, reserve right to cross-examine as to matters testified to in said examination until such further time as may be determined.)

Signature waived by consent of counsel.

M. L. EVELY.

M. L. EVELY, being duly sworn, deposes and says in answer to interrogatories propounded to him by MR. O. F. BARTHEL, as follows, to wit:

Direct examination:

Question 1. What is your name, age, residence and occupation?

Answer. M. L. Evely; age 48; residence Pontiac, Mich.; occupation Superintendent, O. J. Beaudette & Co., Pontiac, Mich.

Q. 2. How long have you been connected with the O. J. Beaudette Co.?

A. Nine years.

Q. 3. And what do they manufacture?

A. Automobile bodies.

Q. 4. During the nine years that you have been connected with them, what automobile bodies have been manufactured by them, principally?

A. Ford's, principally.

Q. 5. And how were these bodies assembled so far as relates to the subject-matter in the suit?

A. Just what do you mean by that?

Q. 6. I mean in reference to the uniting of the parts of the sheet metal body?

A. You mean by spot welding, riveting, etc., like that? The way they are united is by spot welding and riveting.

Q. 7. Why do you rivet in places?

A. Riveting is in places where you do assembling; where you could not handle spot welding.

Q. 8. When did you first make bodies which involved spot welding?

A. According to my private records I started in October, the 26th of October, 1912.

Q. 9. You started to make what?

A. Bodies that were spot welded together.

Q. 10. Were they standard Ford automobile bodies?

A. Yes, they were.

Q. 11. Were they manufactured for the trade?

A. They were.

Q. 12. About how long prior to this time did you rig up for the manufacture of these bodies?

A. Oh, well, I could not say definitely but it took us probably about three months. It takes quite a long while to get our dies out.

Q. 13. From October 26, 1912, and prior to December 3, 1912, how many Ford automobile bodies did your plant turn out in regular production that included these spot welding features?

A. 3,345.

Q. 14. And these were made for the Ford Motor Company?

A. For the Ford Motor Company.

Q. 15. Where was this spot welding on these bodies?

A. On the corners of the rear seat.

Q. 16. How was this spot welding done?

A. Well, to unite the five pieces comprising this assembly into an assembly. I can name the pieces if you wish it—the way we term them.

Q. 17. Were the pieces overlapped?

A. They were.

Q. 18. And were they beaded along this overlapped portion?

A. They were.

Q. 19. And how were they spot welded on this overlapped beaded portion?

A. In the center of the bead.

Q. 20. How were these spot welds placed?

A. Distance apart—about two and one-half to three inches apart.

Q. 21. Will you explain just how the operator would make one of these welds?

A. First of all we take the seat quarter and the corner panel,

both of these have a bead on the edge; one is placed on top of the other one, and spot welded. The bead locates the two pieces in its proper place. Then we move that along on the spot welder from bottom to the top of the seat at intervals of two and one-half to three inches apart.

Q. 22. At these intervals of two and one-half to three inches apart, what takes place?

A. Welds.

Q. 23. How are these welds made?

A. By electricity.

Q. 24. Will you explain how this is done?

A. The contacts are made by two copper points and the work is placed between these two points, and when you trip the machine it throws the current on, the iron being of a nature that will weld. This is really all there is to a weld.

Q. 25. By iron I take it you refer to the sheet metal, do you not?

A. Yes.

Q. 26. I understand that your company records have been lost in a flood which you had some years ago. Is that right?

A. I believe it is, when we moved from the other office up here a lot of our records were lost, and I could not just say what they were, but I know we lost a lot—a great many of our records.

Cross-examination by MR. MCDOWELL:

(Having objected to the taking of testimony at this time, reserve right to cross-examine witness as to matters testified to in said examination until such further time as may be determined.)

Signature waived by consent of counsel.

Adjourned at 5.00 o'clock P.M., to the Office of the Ford Motor Co., Highland Park, Michigan.

Parties met at the Offices of the Ford Motor Company, Highland Park, Michigan, present as before, and the taking of testimony was resumed at 11.30 o'clock A.M., July 25, 1919.

Counsel for defendant gives notice that he will take the testimony of Hubert E. Hartman, Legal Department, Ford Motor Company, in addition to the witnesses before named.

Counsel for defendant offers in evidence copy of decision of Board of Examiners-in-Chief dated June 24, 1919, in Re. Appeal 2844, S. Z. de Ferranti versus Johann Harmatta for improvements in electric welding.

JOHN J. FINDLATER.

JOHN J. FINDLATER, being duly sworn, deposes and says in answer to interrogatories propounded to him by MR. O. F. BARTHEL, as follows, to wit:

Direct examination:

Question 1. What is your name, age, residence and occupation?

Answer. John J. Findlater; age 36; residence 101 Tuxedo Ave., Highland Park, Mich.; occupation Assistant Superintendent, Ford Motor Co., Detroit, Mich.

Q. 2. How long have you been employed by the Ford Motor Co.?

A. I have been at this plant since May, 1913. Before that in the Ford Motor Co. Pressed Steel plant in Buffalo that was acquired in June, 1911.

Q. 3. And prior to that time where were you employed?

A. In the same plant that was known as the John R. Keims Mills, Inc., Buffalo, N. Y., since 1903.

Q. 4. What were your duties at the John R. Keims Mills, Inc., Buffalo, N. Y.?

A. When I started there I was employed as a tool and die maker. Afterwards I had charge of the Press Dept. and of the Tool Room, as Tool Foreman. Later on I was General Foreman of the entire plant.

Q. 5. Prior to the John R. Keims Mills, Inc., of Buffalo, N. Y., being taken over by the Ford Motor Co., did you do any work for the Ford Motor Co.

A. Almost exclusively.

Q. 6. What class of work was that?

A. Transmission cases, rear axle housings, gasoline tanks, fenders, running board shields, steering columns; in fact practically all of the pressed steel parts or the sheet metal parts.

Q. 7. And was this plant known as the Pressed Steel Plant after it was taken over by the Ford Motor Co.?

A. Yes—by the letterheads and the stationery it was known as the Ford Motor Co., Pressed Steel Plant.

Q. 8. After this plant was taken over by the Ford Motor Co. in June, 1911—did you see any other work done there?

A. Yes—they made a steel body.

Q. 9. How was this body made?

A. It was made entirely of steel, no wood was used in it. In taking place of the wood, there were steel sections along the bridge members, channel irons with reinforced holes in them all the way along. I was connected with that in the way of making tools to stamp out these different parts.

Q. 10. How were some of these parts united?

A. They were spot welded together; some riveted; some soldered.

Q. 11. Who worked with you in connection with the building of this body?

A. The body was built under the supervision of Wm. H. Smith and Knudson—these two men had charge of it—that is, they spent their personal time on it considerably.

Q. 12. What kind of machines were used that did the spot welding on this body in question?

A. We had a Winfield Spot Welder.

Q. 13. About when was this spot welder put in the plant?

A. I could not recall the exact date when it was put in.

Q. 14. Did you do some work on this spot welder?

A. I did some work on it myself, personally, in connection with fastening the flange on to the tube on the steering column.

Q. 15. And that was done by means of spot welds?

A. Yes.

Q. 16. About when was this spot welding work done?

A. The welding I did was from eight months to a year before I came here.

Q. 17. And you came here?

A. I came here in May, 1913.

Q. 18. In May, 1913?

A. Yes.

Q. 19. Do you know for what season or model this all-steel body to which you have referred was built?

A. The 1912 body.

Q. 20. Do you know what became of the welder that was used in the making of this body?

A. It was shipped to this plant here.

Q. 21. Did you afterwards see that welder in this plant?

A. Yes.

Q. 22. And is that welder still in use here?

A. I believe it is. I might say here I am familiar with that welder. I can recognize and identify it because it is of a different type than the welders we use right now. It looks different than the other ones. I have used it since I have been here.

Q. 23. And you have used it for spot welding?

A. Yes.

Cross-examination by Mr. McDowell:

(Having objected for the reason that Mr. Stackpole, counsel in charge of case for the plaintiff, is not present, by reason of the fact that he is engaged elsewhere in taking depositions in same cause, reserve right to cross-examine for future time if the Court shall determine this evidence proper.)

Signature waived by consent of counsel.

HARRY P. PROSSER.

HARRY P. PROSSER, being duly sworn, deposes and says in answer to interrogatories propounded to him by Mr. O. F. BARTHEL, as follows, to wit:

Direct Examination:

Question 1. What is your name, age, residence and occupation?

Answer. Harry P. Prosser; age 37; residence Pontiac, Mich., R. F. D. No. 6; occupation General Branch Assembly Work, Ford Motor Company, Highland Park, Mich.

Q. 2. I take it you have charge of the assembling of the parts which go into the cars for the branches, is that it?

A. I look after trouble work and general branch assembly conditions.

Q. 3. How long have you been connected with the Ford Motor Co.?

A. Since March 5, 1907.

Q. 4. What were your duties in connection with your earlier services with the company?

A. Draftsman in the Drafting Room.

Q. 5. And after that?

A. Along about 1911, I think it was, I was placed on the body work. My duties were to see that the body companies were kept in touch with information relating to drafting pertaining to bodies, and also trimming.

Q. 6. And did you have occasion to see this work in process of construction?

A. Yes, it was my duty to visit all body companies.

Q. 7. In your visit to these various plants, what, if anything, did you see which might have bearing in connection with this case?

A. They had spot welders that were used for our back panels by which I mean they used these machines for spot welding beads together.

Q. 8. What places did you have occasion to visit?

A. O. J. Beaudette Body Co., Pontiac, Mich., Wilson Body Co., Detroit, Mich., Kelsey-Herbert Body Co., Detroit, Mich. (now known as the Kelsey Wheel Co.), and the Fisher Body Corporation Detroit, Mich.

Q. 9. Did all these concerns build bodies for the Ford Motor Co.?

A. Yes, sir.

Q. 10. On any of your visits to the Beaudette Body Co. of Pontiac, Mich., what, if anything, did you see that might have bearing on this case?

A. I noticed the operation of spot welding these panels, which was exceedingly interesting due to the fact that they had plans for this design of job; about the only way they could do them.

Q. 11. How was that work done?

A. The panels were laid together with overlapping bead held by two men who placed them in that condition in the machine, and then a man with his foot would bring down one lever at the contact point and immediately the top point would fall on top of the metal panels which would allow, I presume, the current to pass through the metal, fusing the beads together. That would be the contact point underneath the beads and the upper contact point of the machine brought down on top of the metal beads caused the current to flow through and fuse the metal altogether.

Q. 12. Were these beads fused together throughout their entire length, or at the points where the contacts came together?

A. Where the contacts would come together, I think we specified something like two and one-half to three inches apart where the contacts would come.

Q. 13. About when was it that you saw this work at the Beaudette Plant?

A. Our drawings were turned over to Beaudette in the summer of 1912, and it was my duty to follow the work from that time on. I first noticed the spot welding operation along in the fall, in October, I believe, more particularly because my attention was called to the fact that they were having difficulties with their work, and I was out in the factory considerably and noticed conditions and that is how I noted the spot welding work.

Q. 14. But you did go into the quantity production basis on these bodies?

A. Well, the production end I did not have so much to do with. The quantity turned out was not very great until along the latter part of the month of October.

Q. 15. Where was this idea of spot welding these panels together along the beading developed?

A. Why, along back in the early part of 1911, before I went out to the body works, Mr. Wills had a Mr. Kratz working on an all-metal body, similar in shape according to this drawing, and the only way that they could work this out was by using the method of welding the panels together, because the design was carried out similar to this design here. (Witness referring to blue-print already offered for identification.)

Q. 16. Was there anything furnished the O. J. Beaudette Body Co. from which to make the bodies of which you have been testifying?

A. They had a print similar to this one here. (Witness referring to blue-print already offered for identification.) I think Mr. Wills and the O. J. Beaudette Body Co. were in consultation previous to receiving the print.

Q. 17. I hand you herewith print to which you have just referred and would ask you if that shows the type of body to which you have referred?

A. Yes, sir. It shows the shape of the beadings; one overlapping the other.

Q. 18. Is there anything particular about this body which enables you to fix the year as 1912?

A. Our dates are on there at time drawing was submitted.

Q. 19. What date do you find thereon?

A. Shows date on here of June 21, 1912.

Q. 20. And do you find any reference thereon in reference to spot welding?

A. There is a note on here which says "to be spot welded not over

two inches in length on moulding." That word "moulding" is sometimes used in place of beading.

Q. 21. And has this inscription in reference to spot welding been on this drawing ever since the date which it bears, June 21, 1912?

A. I think it has, yes, sir.

Q. 22. Did you have anything to do with the making or development of this drawing or type of body?

A. Yes, sir, it was my duty from time to time to see that drawings were brought up to date on changes which were considered necessary, and each time the date was put on and what the change happened to be.

Q. 23. But no change has been made affecting the spot welding on the moulding or bead, is that right?

A. No, sir, no change has been made.

Q. 24. Do you know about when the Kelsey-Herbert Co. started production on that same type of body?

A. It was about the time Beaudette started their production. I think it was along in November.

Q. 25. And you saw spot welding bodies also made at this plant?

A. Yes, sir.

Q. 26. All of these bodies were used in the regular production of the Ford Motor Co.?

A. Yes, sir.

Q. 27. Where did you get this drawing or blue-print about which you have been testifying?

A. This print was made from drawing which we have in drafting room at the present time. An ink tracing.

Q. 28. And that drawing is being kept for reference in the drafting room?

A. Yes, sir.

Q. 29. So that it would not be convenient to have that drawing go out of your possession?

A. I hardly believe they would let me take it out of there. The print is an exact duplicate of the drawing.

(Counsel for defendant offers in evidence the blue-print or drawing referred to by witness marked "Defendant's Exhibit Touring Car Body T 5403-1913" the blue-print being substituted for the original drawing with the understanding that the original will be produced at any time for purposes of inspection and comparison.)

Q. 30. I notice that this drawing bears a 1913 date within the circle containing the letter T-5403—to what does that refer?

A. That refers to the 1913 design. Our fiscal year production started in August and this body was designed and brought forward so that they could produce it for our 1913 work.

Q. 31. What time in August does your fiscal year start?

A. I don't know at just what date but it's along about July 31st or the first of August.

Q. 32. And this is of the year previous so that the fiscal year would start in August, 1912, for the 1913 season, is that correct?

A. Yes,—that's the idea.

Q. 33. Those bodies made by the O. J. Beaudette Co. and the Kelsey-Herbert Co. were regular standard output of the Ford Motor Co., were they not?

A. Yes—regular output.

Q. 34. And they were made for your company as regular production and under your supervision?

A. Yes, sir.

Q. 35. And the quantity production commenced in October, 1912?

A. Along about October, 1912—yes, sir.

Q. 36. And these concerns rigged up for their manufacture some months prior to October, 1912?

A. Yes, they commenced to get ready, as soon as their contracts were given.

Cross-examination by MR. MCDOWELL:

(Having objected for the reason that Mr. Stackpole, counsel in charge of case for the plaintiff, is not present, by reason of the fact that he is engaged elsewhere in taking depositions in same cause, reserve right to cross-examine for future time if the Court shall determine this evidence proper.)

Signature waived by consent of counsel.

Adjourned at 12.30 o'clock P. M.

Resumed 1.30 o'clock P.M.

HUBERT E. HARTMAN.

HUBERT E. HARTMAN, being duly sworn, deposes and says in answer to interrogatories propounded to him by MR. O. F. BARTHEL, as follows, to wit:

Direct examination:

Question 1. What is your name, age, residence and occupation?

Answer. Hubert E. Hartman; age 34; residence 345 Elmhurst Ave., Highland Park, Mich.; occupation Chief Attorney for the Ford Motor Co., Highland Park, Mich.

Q. 2. You have charge of the Legal Department of the Ford Motor Co.?

A. Yes, sir.

Q. 3. I hand you herewith revised list of the contributors of the Welding Patents Investigating Committee and notice the name of the Ford Motor Company thereon as one of the contributors, and would ask you what you have to say to this?

A. The Ford Motor Co. contributed in a limited sort of a way to this Investigating Committee Fund for the purpose of investigating the merits of a patent, determining what our action should be with reference to recognition of a patent. We contributed twice, I think, under a special arrangement whereby we reserve at all times a separate and independent action and without prejudice to any action we might wish to take independent of the Committee. Contributions were also made upon the understanding that we did not thereby become bound by any obligations to assist in the defense of any action brought against any member of the Committee or contributing party to the fund, reserving at all times the right to decide for ourselves if action should be brought against us whether or not we would avail ourselves of the evidence gathered by the Committee or ask them for assistance in defending the case. When suit was brought against us, after a conference with Mr. Henry Ford, Mr. Alfred Lucking of counsel for this company, it was decided that in accordance with the continued policy of this company, we would defend the case ourselves independent of the Welding Patents Committee. We therefore arranged with our attorneys for our own defense and have so conducted it since.

Q. 3. Have you paid all the bills in connection with the conduct of the defense?

A. We have paid all bills we have any knowledge of. Many thousands of dollars have been paid by us during the progress of the suit to our own attorneys and for expenses and the taking of their testimony.

Q. 4. The original contributions to the Welding Patents Investigating Committee, I take it then, were merely for the purpose of investigating the prior art?

A. Yes, that would be the way I would put it. I might also say that Mr. Ford instructed us personally never to become bound by an agreement in defense of this suit with any other parties who might be interested in it. And it has also been his policy to fight his own patent battles.

Q. 5. I take it, then, that you reserved the right of independent action?

A. Yes.

Q. 6. Do you know whether the moneys contributed for investigation purposes by your company were kept in a separate account?

A. We asked that they be so kept and received a letter from Mr. Milligan (I think it was), Chairman of the Committee stating he was keeping our contributions separate from that of the other contributors, in accordance with our request.

Q. 7. Am I to understand that your company has paid all of the expenses so far incurred in connection with the suit in which you are now testifying?

A. I can say we paid all expenses which we have been called upon to pay; which were represented by attorneys' fees of our attorneys, Barthel-Flanders and Barthel, together with the other counsel he has had assist him and all expenses of preparation of the defense.

Q. 8. No moneys have been received by you or other contributions from the contributors included in the revised list of contributors dated July 17, 1917?

A. No.

Q. 9. Did your company agree to contribute to the defense of any member of the Committee that might be sued under the Harmatta Patent?

A. No, sir.

Q. 10. As the head of the Legal Department, the defense of this suit has been under your control, exclusively.

A. Yes, sir.

Q. 11. Was there ever any permission given to use your name in connection with the list of contributors?

A. No, sir.

(Counsel for defendant offers in evidence revised list of contributors to Welding Patents Investigating Committee, and instructs Notary to mark same "Defendant's Exhibit Bulletin No. 21—July 17, 1917.")

Q. 12. Has the conduct of this case been influenced in any way by any action which the Welding Patents Committee may have taken?

A. No.

Cross-examination by MR. MCDOWELL:

(Having objected for the reason that Mr. Stackpole, counsel in charge of case for the plaintiff, is not present, by reason of the fact that he is engaged elsewhere in taking depositions in same cause, reserve right to cross-examine for future time if the Court shall determine this evidence proper.)

Signature waived by consent of counsel.

A. M. WIBEL.

A. M. WIBEL, being duly sworn, deposes and says, in answer to interrogatories propounded to him by MR. O. F. BARTHEL, as follows, to wit:

Question 1. What is your name, age, residence and occupation?
Answer. A. M. Wibel; age 33; residence 142 Collingwood Ave.,

Detroit, Mich.; occupation Mechanical Engineer, Ford Motor Co Highland Park, Mich.

Q. 2. With what company are you connected as Mechanical Engineer?

A. Ford Motor Company, Highland Park, Mich.

Q. 3. How long have you been connected with them?

A. Seven years—since May 3, 1912.

Q. 4. What are your duties with the Ford Motor Co. in your capacity as mechanical engineer?

A. Specification of all machinery equipment; purchasing same; lay-out of machine operations and other relating work.

Q. 5. In the purchase of machine equipment, do you have occasion to purchase spot welding machinery?

A. Yes, sir.

Q. 6. When did you on behalf of your company make the first purchase of this class of spot welding machinery for the Detroit plant?

A. According to my records this purchase was made the 20th of August, 1912. Received in our plant 19th of September, 1912.

Q. 7. For what kind of a machine was this purchase?

A. This particular purchase was made for a Winfield Spot Welding machine—S-6-M-Electric Spot Welder—Winfield Serial No. 2157.

Q. 8. And about how soon after this machinery was received in September, 1912, was it put into operation?

A. In ordinary practice, after machinery is received in this plant it is put in operation about five days. This time may vary according to the type of machinery, and the amount of work necessary to set it up and put it in operation.

Q. 9. But ordinarily you are behind in machinery equipment so that its installation is urgent?

A. With very few exceptions, equipment is so urgently needed immediately upon its receipt in the shop it is put in operation at the quickest possible time.

Q. 10. Prior to the purchase of this machinery which I understand was the first spot welding purchased for use at the Detroit plant, had your company purchased any other machines?

A. Of this particular kind?

Q. 11. Any other spot welding machines?

A. Not to my knowledge. I believe this spot welder is the first we have ever purchased for use in this particular plant, through the engineering department. Our records show this to be the first machine.

Q. 12. When the John R. Keim Mills, Buffalo, N. Y., was taken over by your company, were there any spot welding machines purchased from them?

A. There was one spot welding machine in the possession of the John R. Keim Mills, but the records would show whether that was in our possession at that particular time or whether it had been pur-

chased through them and used by us. I refer to Winfield Spot Welder—their serial number 318. Our records show that this particular welder was purchased in Buffalo to be used for our body pressed steel work, same as was being done by the John R. Keim Mills.

Q. 13. Can you give the year?

A. This was along in July or August, 1912, to my knowledge and from the records the machinery had evidently been used some time before that. The records show this particular machine was purchased in 1911, through the John R. Keim Mills of Buffalo, N. Y.

Cross-examination by MR. MCDOWELL:

(Having objected for the reason that Mr. Stackpole, counsel in charge of case for the plaintiff, is not present, by reason of the fact that he is engaged elsewhere in taking depositions in same cause reserve right to cross-examine for future time if the Court shall determine this evidence proper.)

Signature waived by consent of counsel.

Adjourned from Friday, July 25, to Monday, July 28, 1919, at 3.00 P.M. o'clock.

WILLIAM H. SMITH.

WILLIAM H. SMITH, being duly sworn, deposes and says, in answer to interrogatories propounded to him by MR. O. F. BARTHEL, as follows, to wit:

Question 1. What is your name, age, residence and occupation?

Answer. William H. Smith; age 48; residence Detroit, Mich.; occupation Engineer, Ford Motor Co., Detroit, Mich.

Q. 2. How long have you been connected with the Ford Motor Co.?

A. Directly since 1912—associated with them in their work since 1905.

Q. 3. What do you mean by directly associated with the Ford Motor Co. since 1912?

A. I became a part of the organization of the Ford Motor Co. in 1912 when they bought the plant I was with at that time.

Q. 4. What plant was it that they bought?

A. John R. Keim Mills, Inc., Buffalo, N. Y.

Q. 5. How long were you associated with them?

A. I was one of the organizers of the company, which was in the year 1900.

Q. 6. What was your official capacity with that company?

A. General Manager.

Q. 7. And that company was afterwards taken over by the Ford Motor Company?

A. It was, yes.

Q. 8. When was this?

A. Fifty per cent of the stock was taken over pro-rata by the stockholders of the Ford Motor Co. in 1911 and one hundred per cent of the stock of the company was taken over by the Ford Motor Company in the early part of 1912.

Q. 9. When this plant was taken over by the Ford Motor Co., was it continued to be called the John R. Keim Mills, Buffalo, N. Y.?

A. No, it was called the Ford Motor Co. Pressed Steel Plant.

Q. 10. It was known as the Pressed Steel Plant, is that right?

A. Yes.

Q. 11. What class of work was done at this plant?

A. Making of sheet metal, sheet steel frames and parts for automobile construction.

Q. 12. Did you do any work there which might have any bearing on the matter here in controversy?

A. What is the matter in controversy?

Q. 13. Spot welding?

A. We built and developed the first steel body that was made for the Ford car at that plant in 1911, that was spot welded.

Q. 14. In what way was this body spot welded?

A. Where the sheet parts joined each other—where they attached to the frames composing the body.

Q. 15. With what kind of a machine was this spot welding work done?

A. With a machine we purchased from the Winfield Co. at Warren, Ohio. At the two contact points, the current was turned on when the lever was brought down by a pressing action.

Q. 16. And how were the metal sheets placed in the machine for welding?

A. The two sheets were held in the machine by hand; this was a developing job at that time and not a production job.

Q. 17. Was the Winfield machine to which you refer one of those put out by the Winfield Electric Welding Co. of Warren, Ohio?

A. Yes, it was from the Winfield Electric Welding Co. of Warren, Ohio.

Q. 18. And about when was this purchased?

A. The date on the order was about March, 1911. The order was placed along about February and we got our machine in March or April.

Q. 19. And was it put to use as soon as received?

A. Yes—we were waiting for it.

Q. 20. What was it that gave you the idea of spot welding these bodies, if anything?

A. The idea of spot welding bodies was original with us. We

had made bicycle hardware and were acquainted with the welding process. When we started to design bodies we called in some builders of welding machines and told them what we wanted. Winfield visited the plant on our request for him there and he told us he was making a machine that was for spot welding and could be assigned to our purpose, with some little alterations.

Q. 21. I take it you refer to Mr. Winfield of the Winfield Electric Welding Company of Warren, Ohio?

A. Yes.

Q. 22. How were the welding spots located on this body?

A. They would be close to the edge where the two metals came together probably an eighth of an inch from the edge and then the spots go along at intervals of one and one-half to two inches according to what strength was required.

Q. 23. That is along the line where the adjacent edges of the sheet metal body overlap?

A. Yes. At that time, understand, the bodies were not made in a single piece. There were two seats to a body proper—the seats were detachable.

Q. 24. And the spot welding work was done in connection with this type of body?

A. It was.

Q. 25. Do you remember for what year or model this body was made?

A. This work was done on the original design of job that existed in 1910 and 1911 and that body was finished and sent here and the work was held pending new design for 1912, and that is why we did not continue with it.

Q. 26. When the new design of 1912 came out, did you take up with any companies the matter of making these bodies?

A. Making the new design?

Q. 27. Yes.

A. The new design I took up with the Fisher and Beaudette Companies personally and explained our method of construction.

Q. 28. Was the spot welding used in connection with these bodies?

A. It was, yes.

Q. 29. And so far as you know, they purchased welding machines for this work?

A. Yes, I think the same kind of a welding machine was purchased—from the same design we used—the Winfield—in the case of Beaudette.

Q. 30. When did you leave the Buffalo plant and come to the Highland Park plant of the Ford Motor Co.?

A. In July, 1912.

Q. 31. And was all this work done prior to your coming to Detroit?

A. The developing of the body and making of the body and welding in Buffalo was done prior to my coming here.

Q. 32. So that you are quite positive that the spot welding work

had been carried out in Buffalo prior to your coming to Detroit in July, 1912?

A. Very positive—I directed it; carried it out.

Q. 33. Do you know John J. Findlater?

A. I do.

Q. 34. Where did you become acquainted with him?

A. He was one of the foremen in the John R. Keim Mills at Buffalo, N. Y.

Q. 35. Did he have anything to do with this work so far as these spot welding machines were concerned?

A. I don't recall now that he had anything to do other than what a tool maker would have to do in building parts. He was acquainted with the machine being there, but I don't believe he had anything to do with the operating of it.

Q. 36. He had something to do with the building of the tools for the machine?

A. Yes, building tools and the tools used in making body parts, but not operating of the machine—that was under the experimental division.

Q. 37. By tools I take it you include dies for the body as well, do you not?

A. There were no dies made for this body. The pieces were cut out and fitted in. What I mean by tools are fixtures and points that would go on the welding machine.

Q. 38. He had to do with the keeping of that machine in running order?

A. He was one of the men that responsibility would come under.

Cross-examination by MR. MCDOWELL:

(Having objected to the taking of testimony at this time, reserve the right to cross-examine witness as to matters testified to in said examination until such further time as may be determined.)

Signature waived by consent of counsel.

DISTRICT COURT OF THE UNITED STATES

EASTERN DIVISION OF MICHIGAN

SOUTHERN DIVISION

THOMSON SPOT WELDER COMPANY

vs.

FORD MOTOR COMPANY

In Equity.

DEPOSITION TAKEN ON BEHALF OF THE DEFENDANT UNDER THE EQUITY RULES OF THE SUPREME COURT, UNDER THE REVISED STATUTES, BEFORE W. S. HELSLEY, ACTING AS SPECIAL EXAMINER BY CONSENT OF COUNSEL.

Warren, Ohio, October 25, 1919.

J. L. Stackpole, Esq., counsel for plaintiff; Melville Church, Esq., and A. S. Pattison, Esq., counsel for defendant.

Certificate of officer and signature of witnesses waived.

MR. GEORGE B. SAWYER, being called as a witness on behalf of the defendant and being first duly sworn, testifies as follows to questions by Mr. A. S. Pattison:

Question. Please state your name.
Answer. George B. Sawyer.
Q. Where do you live?
A. Warren, Ohio.
Q. What is your occupation?
A. Purchasing agent.
Q. For what Company?
A. Peerless Electric Company.
Q. How long have you been connected with the Peerless Electric Company?
A. Since the organization in 1902. Sixteen years, practically.
Q. What was your occupation prior to your employment by the Peerless Electric Company?
A. Preceding was with the Warren Electric and Specialty Company.
Q. How long had you been with that Company?
A. Some three or four years.

Q. What were your duties with the Warren Electric and Specialty Company?

A. I was purchasing agent there.

Q. Were you familiar with their catalogues and advertising matter?

A. I saw their catalogues and advertising matter and more than likely placed the order for the work.

Q. Do you know whether the Warren Electric and Specialty Company preserved in any way any of their catalogues and advertising matter?

A. They did.

Q. In what way?

A. At one time in scrap book form.

Q. I show you a book and ask you if you know what that book is?

A. I recognize the book as the old scrap book of the Warren Electric and Specialty Company.

Q. Do you know where that book has been; I mean what Companies have had this scrap book?

A. On the organization of the Peerless Electric Company it passed to them, as I understand it.

Q. From what Company?

A. The Warren Electric and Specialty Company.

Q. Has this book been in the possession of the Peerless Electric Company from the time it was turned over to them by the Warren Electric and Specialty Company?

A. For anything I know it has been here ever since, continuous.

Q. State whether, if you know, the Warren Electric and Specialty Company issued catalogues and bulletins of their desk fans?

A. They did. That was their custom, their practice.

Q. I call your attention to bulletins numbers 1, 2, 3 and 4, which are pasted in this scrap book, and ask you whether you recognize those bulletins?

A. I do.

Q. When were they published?

A. 1901. I think all of them.

Q. Do you mean for the season of 1901?

A. Yes, sir.

Q. Please explain, if you know, what was the object in issuing these bulletins?

A. I think it was to supplement the catalogue issue. The bulletins were sent out to the agents of the Warren Electric and Specialty Company and circulated as advertising matter.

Q. Am I correct in understanding that this scrap book was the property of the Warren Electric and Specialty Company and passed from them to the Peerless Electric Company when the latter Company purchased the Warren Electric and Specialty Company?

A. Your question is not quite right. The Peerless Electric Com-

pany did not purchase the Warren Electric and Specialty Company. When they organized the Warren Electric and Specialty Company was sold absolutely. The Peerless Electric Company was organized as a distinct and new company. They took over some things, however.

Q. State, if you know, whether the Peerless Electric Company took over the fan business of the Warren Electric and Specialty Company?

A. They did.

Q. And in taking over this they took at the same time this scrap book?

A. That was a part of the inheritance.

(The scrap book testified about by the witness is offered in evidence on behalf of Defendants and it is marked "Warren Electric and Specialty Company and Peerless Electric Company catalogue and bulletin scrap book number A-A-A-A.")

Cross-examination by MR. STACKPOLE:

X-Q. Mr. Sawyer, I find in this scrap book a number of references to the Colonial Fan and Motor Co. What relation, if any, had that Company to the Peerless Company?

A. Well, the Colonial Fan and Motor Company was simply a selling agency of the Peerless Electric Company. They manufactured nothing themselves.

X-Q. They sold the Peerless Fan?

A. Sold the Colonial Fan, made by the Peerless Electric Company.

X-Q. Did they sell any fans not made by the Peerless Electric Company?

A. Not to my knowledge.

X-Q. That is all.

MR. F. P. MCBERTY, being called as a witness on behalf of Defendants and being first duly sworn, testifies as follows to questions by Mr. A. S. Pattison:

Question. Are you the F. P. McBerty who has previously testified in this case?

Answer. I am.

Q. You testified in this case before Judge Killits that you were connected with the fan department of the Warren Electric and Specialty Company and also their successors, the Peerless Electric Company?

A. I did.

Q. Please explain the construction of the desk fan blade or blades, as the case may be, that were manufactured and sold by

the Warren Electric and Specialty Company during the season of 1901?

(This testimony is objected to as not in response to the last testimony taken by the plaintiff.)

A. They had a desk fan made up with a steel spider which constitutes the center hub or support arms for carrying the blades, to which the blades were in some instances riveted, and the same general construction consisting of a steel spider in which the blades were spot-welded and also they had fan blades with a brass center which constituted the hub and a support arm for the fan blades, these blades riveted to the brass centers.

Q. How many rivets did the fan blades have which contained the brass center?

A. They had three rivets to the blade.

Q. How many rivets to the blade did the fan blades have which contained the steel center to which you have referred?

A. Two rivets to the blade.

Q. State what difference, if any, there was in the construction of the steel center with the two rivets for each blade and the steel center which you say was spot welded to the blades?

A. Steel center that was riveted to the blades were provided with holes punched to receive the rivets, the blades also had corresponding holes punched to receive the rivets, and the spot welded had no holes punched in the extended arms and the blades had no holes punched.

Q. Am I correct in understanding that the Warren Electric and Specialty Company manufactured and put on the market in the season of 1901 three types of desk fan blades, one with a brass center riveted to the blades, one with a steel center riveted to the blades and one with the steel center spot welded to the blades?

A. You are correct in that statement.

Q. Do you know whether the Warren Electric and Specialty Company issued catalogues and bulletins illustrating their desk fan products?

A. Yes, they did.

Q. Do you know what, if anything, was done to preserve any of these advertising catalogues or bulletins?

A. They had what was commonly called a scrap book into which they pasted copies of the various bulletins, catalogues and leaflets, as well as pages out of mechanical and electrical journals which carried illustrations of these products.

Q. Would you be able to recognize that scrap book?

A. I would.

Q. I call your attention to the book before you and ask you what that is?

A. That is the scrap book that was used for this purpose of preserving the advertising matter.

Q. State, if you know, what was done with this book when the Warren Electric and Specialty Company sold out its fan business?

A. This book passed into possession of the Peerless Electric Company, who purchased the fan motor interests of the Warren Electric and Specialty Company.

Q. The Peerless Company referred to by you, is that the Company which is occupying this office where we are now taking the deposition?

A. Same Company.

Q. I call your attention to bulletin number one, which is pasted in this scrap book, Defendant's Exhibit A-A-A-A, and ask you whether that illustrates either of the three types of fan blades which you say were manufactured and sold by the Warren Electric and Specialty Company in the year 1901?

A. That bulletin number one, season of 1901, illustrates the high grade desk fan equipped with the brass center blade with the three rivets mentioned.

Q. I ask you the same question in respect to bulletin number two?

A. Bulletin number two illustrates desk fan with the steel centers with the two rivet blade.

Q. I ask you the same question in respect to bulletin number three?

A. Bulletin number three illustrates the desk fan with brass center and three rivet blade.

Q. I repeat the question in respect to bulletin number four?

A. Bulletin number four illustrates Peerless fan with the steel center and spot welded blades or blades spot welded to the center.

Q. What season were these bulletins issued?

A. Those are in the season of 1901.

Q. What was the object, if you know, of sending out these bulletins?

A. Practice of sending out bulletins was adopted as it made it much easier to mail the circular covering a particular type of desk fan without sending a complete catalogue and also calling attention to the season's type.

Q. You have previously testified in this case that the steel center fan with two rivets to the blade was first manufactured and put on the market by the Warren Electric and Specialty Company for the season of 1901. What type of fan was this blade used on?

A. This blade was originally developed to take care of the demand for a comparatively cheap fan. The intention was to eliminate the expensive material used in the high grade fans.

Q. Which bulletin, if either of the four, to which I have called your attention shows the cheap type fan?

A. It is bulletin number four, illustrates the cheap fan.

Q. I notice and you have stated that bulletin number two has the steel center and the two rivets and this bulletin shows that type of blade attached to the "A-6" type of fan. What explanation, if any, have you to make in respect to this illustration?

A. This A-6 fan which is known as one of the high grade fans is apparently equipped with a fan blade having a steel center and possibly steel blades, brass plated, giving it the same appearance as a brass fan as far as the finish is concerned.

Q. How can the blade, the steel center blade as you say primarily developed for the cheap fan, be applied to the more expensive fan type "A-6" as shown in bulletin two?

A. I can best answer that question by saying that our fan shafts were all of a standard dimension, three-eighths of an inch in diameter, and any fan blade will fit any fan. This was standard practice with us all the time I was with the firm and still is.

Q. By that do you mean that the three types of blades manufactured for the season of 1901 were interchangeable in respect to the several fan motors that were manufactured with the different types of fans?

A. They were.

Q. Please state how many kinds, if more than one, of desk fan centers were manufactured and put on the market by the Warren Electric and Specialty Company for the season 1900?

A. Well, there was the brass strip center and the cast brass.

Q. Please examine the Warren Electric and Specialty Company's 1900 catalogue, which is pasted in the scrap book, Defendant's Exhibit A-A-A-A, and point out if you can the strip type of center that you refer to?

A. Well, this design is fully illustrated here on page eleven of the 1900 catalogue.

Q. How many rivets did this center have per blade?

A. There are two rivets per blade and four rivets in the center holding the strips to the hub.

Q. Of what material were the strips of this center made?

A. Made of brass.

Q. Does this catalogue show any other type of center than the strip one to which you have referred?

A. No, there is no other type of the center illustrated in this catalogue excepting the strip center.

Q. Was this strip center placed on the market by the Warren Electric and Specialty Company at a succeeding season after the year 1900?

A. It was not.

Q. Why?

A. The design proved too weak and ineffectual, causing a lot of trouble and expense. We were compelled to replace defective blades.

Q. By this do you mean that the strip brass center was abandoned after its use in the season of 1900?

A. Yes, it was entirely abandoned after the season of 1900 on account of this weakness.

Q. Have you examined the Plaintiff's Exhibit 51 now on file in the court at Detroit which is stated by the witness for the plaintiff to be a Warren Electric and Specialty Company's G-1 desk fan?

A. I have.

Q. When and where did you examine this?

A. I examined this fan in the clerk's office of the court in which this case is pending at Detroit, Michigan, on Thursday, October 23, 1919.

Q. Are you able to say whether this Plaintiff's Exhibit 51 does or does not contain a G-1 type of fan blade made by the Warren Electric and Specialty Company?

A. It is impossible for me to positively identify that fan blade as having been made by the Warren Electric and Specialty Company?

Q. Why?

A. There were other makes of fans being placed on the open market at that same time that had blades and centers of the same shape and design, same diameter, and would fit the same shaft.

Q. Please describe, if you noted, the general condition of the fan and its blade?

A. The motor itself together with its accompanying guard are in an excellent state of preservation; motor is clean; bearings are tight and the commutator is smooth, and apparently not been worn much. The fan blades are in bad mechanical condition, blades having been apparently bent repeatedly and the center itself is out of true, indicating hard usage and possible extended service.

Q. What, if anything, have you to say in view of these facts as to whether that motor and fan blade are the original motor and fan blade as sent out by the manufacturer?

A. From my knowledge of desk fans and motors I would say that that fan blade did not belong to that motor, or in other words, it was not the original blade sent out with the motor in question.

Q. Did you note the rivets on the fan blade of Plaintiff's Exhibit 51?

A. I did.

Q. What, if anything, did you notice about these?

A. These rivets have all indications of being machine riveted; that is, they have been riveted by a mechanically operated riveting machine.

Q. Did the Warren Electric and Specialty Company use a riveting machine of any kind that would produce the results shown on the fan blade, Plaintiff's Exhibit 51, during the year 1901?

A. No, they did not have any riveting machine at all, riveting all their fan blades by the aid of a rivet set and a hammer.

Q. Does the condition of the rivets on the fan blade of Plaintiff's Exhibit 51 enable you to say whether it could possibly be the Warren Electric and Specialty Company's 1901 blade?

A. That is impossible for me to say definitely. If the rivets are machine driven it could not have been made by the Warren Electric and Specialty Company.

Q. Are you familiar with the appearance of hand and machine headed rivets?

A. Yes.

Q. What is your opinion as to whether the rivets in the blade of Plaintiff's Exhibit 51 being hand headed or machine headed?

A. My opinion would be that they were headed up with aid of a machine riveter.

Q. While you were in Detroit on the 23rd did you examine the Plaintiff's Exhibits No. 40 and No. 41, which were offered in evidence as a fan motor and fan blade manufactured by the Warren Electric and Specialty Company?

A. I did.

Q. What, if anything, did you notice during this examination of these exhibits?

A. The thing that struck me most forcibly was that the fan blade did not belong on that fan motor.

Q. What enables you to say that?

A. The fan was a nickle plated blade, while the general finish of the fan motor is polished brass. A standard practice was to make all of the metal parts correspond in finish, being entirely polished fan known as the brass finish fan or all nickle plated, if it is known as the nickle plated fan.

Q. The 1901 Warren Electric and Specialty Company's catalogue, page 17, refers to "G" type of fan as "rigid Iron Clad Fans;" please explain, if you know, what this description of that fan means?

A. The intention of that description was to indicate that all of the parts of the fans that could be possibly made of iron were manufactured of that material such as the fan blades, fan centers, hubs and guards.

Q. In connection with the testimony of Robert W. Clark, the witness produced in rebuttal by the Plaintiff, there was offered in evidence as "Plaintiff's Exhibit 18, specimen of spot welding prepared by Clark," a number of spot welded specimens showing the spot welding of blades or bars of steel of various thicknesses. I have asked you to prepare a specimen of spot welding showing the parts of metals. If you have done so, will you please produce the same and explain it?

A. The samples that I have here are samples that I spot welded on one of my commercial welding machines of a similar type and consisting of two pieces of thin steel spot welded together; to one

piece of this thin steel is spot welded a piece of commercial tin-plate; and to this piece of commercial tin-plate is spot welded another piece of tin-plate of the same gauge and cut from the same sheet. To this second piece of tin-plate is spot welded a piece of black steel wire, and to this piece of steel wire is electrically welded a second piece of wire at right angles to the first piece.

Q. State what kind of electrodes you used?

A. This entire demonstration was done with the aid of two copper electrodes that are used in one of our standard spot welding machines.

Q. Please explain more fully the characteristics of what you have referred to as tinplate?

A. The tinplate, commonly known as commercial tinplate, consists of thin steel plate which is pickled to remove all impurities and scale and then dipped into a bath of melted tin which puts a fine deposit of tin over the entire surface of the plate on both sides.

(Defendants counsel offers in evidence the specimen produced by the witness and the same is marked "Defendant's Exhibit McBerty specimen exhibiting welding of different metals by use of copper electrodes.")

Q. Please produce if you can the copper electrodes of which the specimen just offered was welded?

A. I have here two copper electrodes that were used in this welding machine to produce the previous specimen or sample of spot welding.

(Defendant's counsel offers in evidence the electrodes just produced by the witness and the same are marked "Defendant's Exhibit McBerty copper electrodes used for spot welding different metals.")

Q. I now show you another specimen of spot welding work and ask you to tell us what it is and how it was made?

A. This second sample demonstration was produced from identically the same grade of material of the previous sample spot welded with the copper electrodes and consists of a thin piece of commercial steel sheet welded to another piece. Second piece of steel sheet is welded to a piece of commercial tinplate. This piece of commercial tinplate is spot welded to a second piece of tinplate of the same grade of material, and to this second piece is spot welded two pieces of black steel wire and to these two pieces of black steel wire is spot welded a third piece of black steel wire at right angles.

Q. What kind of electrodes was used in welding these specimens you have just described?

A. This specimen was welded in every particular with the aid of two steel electrodes made out of commercial cold roll steel bar, the points of same being approximately the same shape as our copper electrodes and being held in the same machine that was used in spot welding with the copper electrodes.

(Defendant's counsel offers in evidence specimen referred to in the last question and the same is marked "Defendant's Exhibit McBerty specimen exhibiting welding of different metals by use of steel electrodes.")

Q. Please produce, if you have them, the steel electrodes referred to in your preceding answer with which you welded your second specimen?

A. I have here the two steel electrodes which were used in our standard spot welding machine for producing the second specimen of sheet metal spot welding.

(Defendant's counsel offers in evidence the electrodes produced and the same are marked "Defendant's Exhibit McBerty steel electrodes used for spot welding different metals.")

Cross-examination by MR. STACKPOLE:

X-Q. Did you ever in 1901 or thereabouts weld steel fan blades to the arms of brass centers?

A. No, never did.

X-Q. What is the diameter of the copper electrodes used by you in making Defendant's Exhibit McBerty exhibit welding of different metals by use of copper electrodes? What was the diameter of the point of the electrodes?

A. The diameter of the electrode, the copper electrode itself, was seven-eighths of an inch, and the point of contact with the metal was approximately an eighth of an inch.

X-Q. How high was the bell from the end of the electrode, the part where it reaches its full width?

A. That is difficult to say without measuring, but approximately five-sixteenths of an inch from the end of the point to the upper edge of the bell.

X-Q. And what are the corresponding dimensions in the steel electrodes used by you in welding the other specimens?

A. Approximately the same. The intention was to make them the same dimensions and general shape.

X-Q. Do you equip any of your spot welding machines with steel electrodes like those in evidence for commercial use?

A. We do not.

X-Q. You made these specimens and used these electrodes at the request of counsel for the Defendant?

A. I did.

X-Q. In the case of the brass strip centers used by the Warren Company in 1900 were the strips fastened to the face of the hub?

A. They were.

X-Q. So that no part of the hub projected between the strips?

A. That question is rather indefinite. That is, between strips of the lateral surfaces?

X-Q. Yes.

A. There was no part of the hubs between the strips.

X-Q. On page fourteen of the Peerless catalogue of 1900 at the bottom the hub is shown as projecting between the strips or arms, is it not?

A. No, it does not show it extending between the strips. It extends up the side of the strips.

X-Q. Extends up the side of the strips?

A. Yes, sir.

X-Q. What do you mean by that?

A. Just what I said. It extends up the side of the strips.

X-Q. Is that true of the cut on the top of the page?

A. No, sir; it extends also up the side of the strip.

X-Q. And you say that the cut at the bottom of the page fourteen does not show the hub extending out between the two strips?

A. No, sir.

X-Q. It seems to me that the hub does extend between the two strips that are approximately extending towards the observer on the part that is shown are direct on the hub. Will you look again and see if that is not true?

A. That extends right up beside the strip. Your strip runs in here and your hub extends up on each edge of it at the side of the strip, but it does not extend between the strips at all.

X-Q. I think we have been using different terms and meaning the same thing. As I look at this figure on page fourteen at the bottom there was a part of the hub which projects into the angle between the two arms of the spider?

A. Into the angle at the intersection of the two arms, yes, sir.

X-Q. And in figure on page ten as I look at it there is not part of the hubs which extend into the angle between the two arms of the spider; is that true?

A. That I would say that it did because this bar here comes apparently square into the side of the hub.

X-Q. The cut on page ten is a view taken rather from the back of the hub, is it not?

A. Yes, sir.

X-Q. Now, looking at the cut at the top of page ten tell me whether the hub extends into the angle between the arms?

A. I couldn't say about that. I couldn't say whether it did or did not.

X-Q. Do you see any recess cut in the hub there to receive the arms?

A. My eyesight is too poor to see whether there is or is not a recess in there.

X-Q. In all of the cuts in the 1900 catalogue there are shown two rivets or rivet holes on the middle line of each blade. Is not that true?

A. That is, you are referring to these rivets?

X-Q. Yes, on the middle line?

A. That is, in the blades? Yes, all the cuts indicate the two rivets per fan blade.

X-Q. On the center line?

A. On the center line of the blade.

X-Q. Does this 1900 catalogue show all the types of fans put out by the Warren Company in 1900?

A. The types of fans?

X-Q. Desk fans?

A. That shows all the types that was produced at that time, that is, that season.

X-Q. On page twenty-nine of the American Electrician for April, 1901, which appears in the scrap book, is a cut of the type E-2 fan. Does that show a brass spider or the steel spider?

A. That would indicate from the place of the rivets that is a brass spider.

X-Q. How many rivets can you see on each of the blades in this picture?

A. On the upper blade I can see three rivets distinctly, on the middle blade——

X-Q. Right or left?

A. On the left middle blade there are shown two rivets placed about equal distance from the edge of the blade which would indicate there was a third rivet on that same blade. On the other two blades owing to the way the light apparently struck the blade the rivets did not show.

X-Q. Were there any fans made in 1902 with steel centers?

A. Yes, sir.

X-Q. Which ones?

A. That is, you refer now to fan motors or fan blades, you mean fan motors equipped with steel centers? Yes, the G type we equipped with those as well as other types.

X-Q. What other types?

A. Well, I couldn't say definitely, the other types that was ordinarily equipped with the brass blades and brass centers.

X-Q. They might be in type then?

A. They might be in type.

X-Q. I find a catalogue of the Colonial Fan and Motor Company which appears to be for the season of 1903. Look at the cut of the

type S-3 fan shown on page seven. How many rivets do you see on those blades?

A. I don't see any indication of any rivets at all on those blades.

X-Q. And how about the S-4 fan on page nine of the same catalogue?

A. That does not show any as far as I can see either.

X-Q. Look at the cut on page twelve of the Electrical Review for May 9, 1903, showing a Peerless fan. Do you see a rivet head on the right hand blade and lower blade?

A. No, I do not see any rivets on the right hand blade or the lower blade.

X-Q. Calling your attention to the cut of two Peerless fans in a bulletin or advertising matter of 1910 of the Peerless Electric Company. Do these cuts show steel spiders or brass?

A. Those cuts show steel spiders?

X-Q. Why?

A. They have two rivets to a blade, centrally located.

X-Q. Any other reason?

A. No, that would be the only reason I could attribute to their being steel spiders.

X-Q. Are these 1910 steel spiders of the same description as the steel spiders you say were used in 1901?

A. Yes, that would be the same type of steel spider.

X-Q. Now, in the Peerless catalogue of 1910, a copy of which I find loose in this scrap book, are the spiders shown steel or brass of the desk fans?

A. The shape of all of these spiders indicates they are stamped steel.

X-Q. Like you say you used in 1901?

A. Yes, sir.

X-Q. And they were put on the fan the same way, were they?

A. As far as I know they were. I wasn't at the Peerless Electric Company's plant in 1910.

X-Q. Did you have any steel spiders in 1900?

A. We did not.

X-Q. Or steel blades?

A. I couldn't say in reference to the steel blades. We had the dies to produce the steel blades.

X-Q. You did say on the spiders you did not have any?

A. Yes.

Redirect examination by MR. A. S. PATTISON:

Rd-Q. After the fan business of the Warren Electric and Specialty Company was taken over by the Peerless Company the latter part of 1902, please state whether your connection with the fan department continued as intimate as it was before the transfer?

A. It was not. I became general superintendent of the Peerless

Electric Company as soon as that Company was organized and devoted almost my entire attention to the development of a line of power motors and merely had a general supervision of the fan motor product with practically no time devoted to improving or further developing of the fan or fan motors.

Rd-Q. What was your title with the Warren Electric and Specialty Company before they sold their fan department to the Peerless Company?

A. I was superintendent of the fan motor department.

Rd-Q. But after the fan department was taken over what was your title with the Peerless Electric Company?

A. I was general superintendent of the Peerless Electric Company.

Defendant's counsel offers in evidence the following:

(1) Certified copy from the records of the U. S. Patent Office, extracts from the German publication entitled "Patentblatt," issue of March 14, 1906, covering title page and pages 363 and 373, and the same is marked "Defendant's Exhibit Number B-B-B-B extracts from Patentblatt of March 14, 1906."

(2) Certified copy from the records of the U. S. Patent Office of extracts from the official German publication entitled "Patentblatt," issue of June 22, 1904, covering title page and pages 863 and 867, and the same is marked "Defendant's Exhibit C-C-C-C extracts from Patentblatt issued June 22, 1904."

(3) Translation of portion of Exhibit B-B-B-B which is marked "Defendant's Exhibit D-D-D-D."

(4) Translation of portion of Exhibit C-C-C-C which is marked "Defendant's Exhibit E-E-E-E."

It is agreed that the translation is admitted subject to correction if found incorrect.

(5) A printed copy of U. S. Patent to A. M. Stanley, Assignor to General Electric Company, Number 1,176,614, dated March 21, 1916, and the same is marked "Defendant's Exhibit F-F-F-F."

It is hereby stipulated and agreed by and between counsel for the respective parties hereto that the exhibits introduced in connection with the testimony taken by way of deposition out of court or by way of deposition in open court before or during the session before Judge Killits on May 19th, 20th and 21st, 1919, if not all marked as filed, may be marked by the Clerk as filed of the said 21st day of May, 1919; and further that the depositions and exhibits introduced by either party since said last named date, if not all marked as filed may be marked by the Clerk as filed on the day of final hearing herein.

(No Model.) 2 Sheets—Sheet 1.

E. THOMSON.

APPARATUS FOR ELECTRIC WELDING.

No. 347,140. Patented Aug. 10, 1886.

Fig. 1.

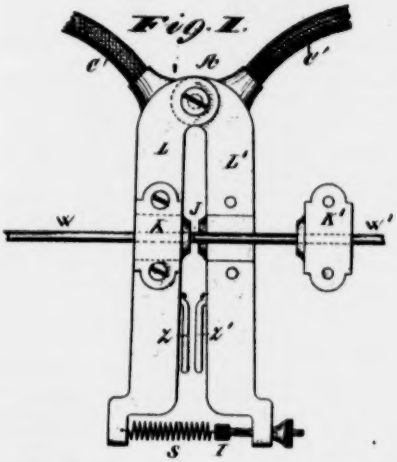


Fig. 2.

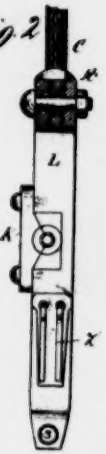


Fig. 3.

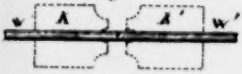


Fig. 4.



Fig. 9.

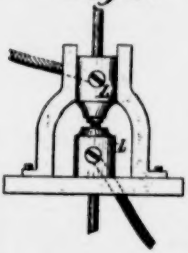


Fig. 5. Fig. 6

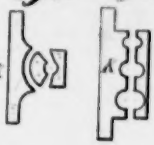
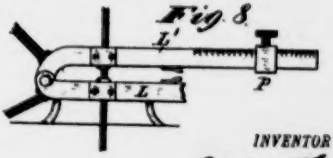


Fig. 7



Fig. 8.



WITNESSES:

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BY

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1022

(No Model.) 2 Sheets—Sheet 2.

E. THOMSON.

APPARATUS FOR ELECTRIC WELDING.

No. 347,140. Patented Aug. 10, 1886.

Fig. 13.



Fig. 14.



Fig. 10.

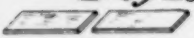


Fig. 11.



Fig. 15.

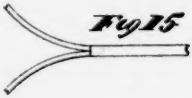


Fig. 16.

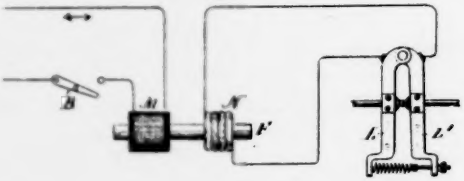


Fig. 17.



Fig. 18.

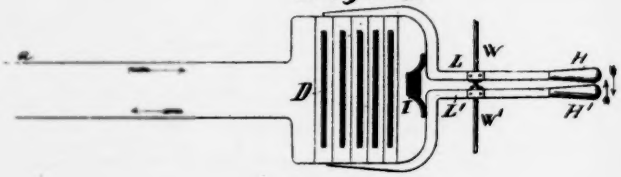


Fig. 12.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

APPARATUS FOR ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 347,140, dated August 10, 1886.

Application filed March 29, 1886. Serial No. 197,077. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Method of and Apparatus for Electric Welding, of which the following is a specification.

My invention consists in a novel art or process of and apparatus for forming joints between metal wires, bars, and the like by the agency of an electric current. This art or process I term "electric welding."

One of the chief objects of my invention is to secure a true and firm joint between metal wires, &c., without the usual necessary application of solders or metals melting at a lower temperature, and to secure a complete weld of the two abutted ends, which shall be as strong and firm as any other part of the wires, bars, &c., used.

My invention enables sections of wires—as of copper and its alloys, iron, silver, gold, &c.—to be jointed into one continuous length, and the joints, being of the metal itself nearly uniform in texture with the rest, are strong, and can be bent, twisted, hammered, and drawn without rupture—a result not achieved before my present invention.

Briefly, the new art, which I term "electric welding," consists in bringing together with a certain pressure the ends of the wires, bars, &c., to be jointed, and which pressure must be small, and can with my apparatus be regulated at will, and then constituting the abutted ends and a slight portion of the wire or bar on each side of such ends as the path for an electric current of great volume, but not necessarily of an electro-motive force of more than a few volts, (depending on the nature and size of wire or bar.) With large bars the current must be much greater than with small bars or wires, and it is well to employ as a source of current a regulable apparatus. Either continuous, intermittent, or alternating currents of electricity may be employed.

I will now proceed to describe, by reference to figures, the manner in which I have practiced the process and the apparatus which I have found suitable therefor.

Figure 1 shows my jointing-clamp with wires ready to be electrically welded. Fig. 2 is another view of a portion of the same. Fig. 3 shows the placing of wire or bars in line in the clamps before abutting the ends for welding. Fig. 4 shows a joint just formed, there being usually a slight burr or flange formed at the junction after passage of current. Fig. 5 shows removable clamps for holding wires of varying sizes. Fig. 6 shows a clamp for holding wires of three sizes as needed. Fig. 7 indicates the substitution of manual pressure for elastic pressure in forming the joint. Fig. 8 indicates the substitution of gravity for elastic pressure in forming the joint; Fig. 9, a modification of the same. Figs. 10, 11, 12, 13, 14, and 15 indicate the application of my process to other forms of bar, &c. Fig. 16 illustrates one of the ways of generating the heavy currents needed in the practice of my invention. Fig. 17 illustrates a modification of a portion of Fig. 16. Fig. 18 shows another way of obtaining currents of sufficient volume for practicing my invention.

I reserve for other applications for Letters Patent certain other improvements in the apparatus used in practice.

In Fig. 1 is shown the apparatus applicable to the case of joining ends of wires, &c. It consists of two arms or clamp-holding bars, L L', one only of which need be movable. This is swung on a joint at A, which, when the arms L L' are wholly metallic, is insulated by interposed washers and tube of insulating material, as mica, in a way to allow the free movement at A, but no passage of current at such point. Heavy cables C C', preferably very many times the section of the wires to be jointed, connect L L', respectively, with the terminals of apparatus, from which, at will, a sudden flow of current of considerable volume may be obtained. Suitable clamps, K K', (this latter, K', shown removed,) serve to bind down firmly and make good electrical contact with a portion of the length of the wires to be jointed. The wires W W'—say of copper, brass, iron, steel, or German silver—are placed in the clamps with their ends abutting and projecting, as shown at J, the edges of the clamps being countersunk or rounded, so as to leave a small portion of W and W' unclamped near J. An adjustable spring, S, arranged to pull L L' together, but insulated by an interposed block of insulator I, is used to

1024

keep the wires W W' abutted with a slight pressure. I sometimes provide a set of heavy copper contacts, Z Z', which automatically connect L L' after the joint at J is effected, accompanied, as it is, by the slight approach of the parts L L' under the action of the spring S when the metal at J welds.

Fig. 2 shows one leg, L', removed and the remaining one, L, seen from between them, showing opening for wire and insulation of joint A in black.

Fig. 3 shows wires W W' just before abutment together with their relation to the clamps K K'. When in contact, as in Fig. 1, a powerful current is passed from C to C', which current has to pass the abutted ends at J. However, if of great volume, even though the resistance at J be less than one fifty-thousandth of an ohm for very moderate-sized wires, heat will be developed in the ratio of the square of the current flowing, which heat will be formed at J in sufficient amount to fuse the abutted ends, and under slight pressure they will weld over their whole section with a slight projecting burr or expansion, as indicated at J, Fig. 4. This will be seen to occur by the slight yielding at J and the approach of L L' toward each other by the elastic force of S. The current is then stopped and the clamps removed, and the wires W W' will now be found united into one. The burr can be readily filed off or ground off, and if the clamps K K' were set oppositely at the start the joint will be true with the axis of each wire. Of course it is important that the wires shall be clean to insure contact, and though usually the joint is well formed without any flux, such as borax, there is no objection to its use in slight amount in certain cases. In such cases, after abutting the wires, a little moist powdered borax or other flux may be applied at J. The clamps for holding the wires may be made removable shells, so as to be readily substituted when different sizes of wire are to be clamped, although simple V-grooves may be made in the clamps to accommodate various sizes; or universal chucks may be employed. All such variations are without importance, and are evident to mechanics.

Fig. 5 shows removable clamps, and Fig. 6 a compound clamp with three sets of grooves of different sizes.

In Fig. 7 the spring S, Fig. 1, is left off, and is replaced by handles, which may be manually pressed together in forming the joint. A little practice will show the pressure to be used in each case.

In Fig. 8 an adjustable weight, P, sliding on L', extended, which latter may be graduated, forms an efficient substitute for S, Fig. 1, the other parts being suitably disposed.

Instead of using a swinging joint, as A, Fig. 1, it is sometimes preferable, as where heavy wires are to be accurately abutted and jointed, that the movable piece L shall slide in guides, giving a rectilinear motion, though equivalent parallel or right-line movements may be attained in other well-known ways.

The clamps K K' can be shaped to suit various forms of wires or bars to be joined—such as square, hexagonal, rectangular, &c.—and it will be evident that tubes can be operated upon instead of bars or wires.

Fig. 10 shows two rectangular bars prepared for juncture.

Fig. 11 shows how my invention may be employed to effect joints between pieces of different form, W' in the figure being a flanged head. In this connection it may be remarked that my invention gives a great advantage in permitting the formation of joints without heating the metal to any considerable distance on each side of the joint, so that temper, elasticity, and finish remains uninjured.

Fig. 12 illustrates the union of a rectangular bar to a round bar. It may be here said that in all cases it is best that the clamps for holding the pieces be fitted to the shape of the pieces, and clamp them quite near the junction. In such way even rings, as in Fig. 13, may be rendered endless; but in this case more current is needed, as a portion passes around the ring; but, further, on account of the greater length, it is small compared with the portion traversing the joint when the clear ends are well abutted and the clamps K K' embrace the ring, as indicated. In Fig. 13 the lower part of the ring B can, if needful, be immersed in water to avoid any chance of heating.

In Fig. 14 a long bar or wire of metal or a band can be made endless, as in Fig. 13, and I propose to apply my invention to the production of endless steel pieces for band-saws and the like, and so to remove the weaker brazed joint and the consequent destruction of temper near where it is made. My invention can also be applied to the production of endless wires for endless twisted cables, and it may also be used to join the separate ends of the wires of a twisted cable and so make the cable endless. It is also possible to join two smaller pieces to one larger piece, as in Fig. 15.

To insure success in effecting a joint the parts opposed should, if possible, be of the same section or at least of such dimensions and melting-points as to melt nearly at the same time, and so secure a thorough union of the particles of both pieces. However, junction is easily effected between German silver and steel or iron and between brass and iron, and in many other cases where the metals joined differ.

As an example of a means of securing a large flow of current with little electro-motive force, such as is demanded by my invention, the arrangement shown in Fig. 16 is used. In this case an induction-coil consisting of a core, F, of iron wire wound with two windings is employed. One of the windings is of fine wire, M, and connected into a circuit by

plying alternating currents suited to the size wire in M, while a simple switch, B, controls the circuit through M. The other winding, N, is a very few turns of very heavy conductor connected by short and thick connections to the wire-jointing clamps L L', as in Fig. 1. When all is ready to make a joint, the switch B is closed for a second or two, at which time the currents in N will be induced, and since the resistance of the wires to be joined will be a large fraction of the actual resistance in the secondary circuit, so a large portion of the energy will be evolved where the joint is to be made, incipient fusion will result and subsequent thorough welding. To save parts it may be simpler to give the coil N the disposition indicated in Fig. 17 by attaching L L' to its terminals, and having the terminals possess a slight elasticity toward one another, so as to give the pressure needed to make the joint.

In Fig. 18 is illustrated the employment of a cell of secondary battery as a source of current. It need only be a plain Planté battery of large surface, so as to yield, on occasion, many thousands of amperes, according to the diameter and the conducting-power of the wires to be joined. It is charged by being placed in a circuit, *a b*, of moderate current-supply, such as an arc or other line.

The heavy conductors L L', one from each terminal of the battery, are ordinarily sprung apart and insulated, as at I. When the wires W W' are in place, they are kept out of contact until the charge of the battery is sufficient to give a flow of current of a few seconds duration, at which time the handles H H' are pushed nearer together, thus effecting contact, fusion, and welding between the ends of the wires W W'.

Other sources of electricity may be used, such as currents from large dynamos, either direct current or alternating in character.

Instead of employing the pressure of a spring, or gravity, or manual pressure to effect the welding, I may obviously employ pressure obtained from any other source.

What I claim as my invention is—

1. The herein-described art of effecting union between two pieces of metal, consisting in holding the same in contact at the point of union and simultaneously passing a current of electricity through the joint of a power to fuse and unite the pieces, as and for the purpose described.

2. The process or art of electric welding, consisting in the application of heavy currents to traverse a joint to be welded, and the simultaneous application of a pressure or force tending to move together the pieces to be welded.

3. The process or art of causing union between the ends of metal pieces in contact by simultaneous application of fusing-currents of electricity and mechanical pressure at the contact.

4. In an apparatus for electric jointing of metals, suitable clamps for holding the pieces to be joined movable toward one another, and means, such as a spring, for exerting a pressure for forcing the pieces into contact, and means of applying fusing-currents of electricity while such pieces rest in pressure contact, as described.

5. The combination, in an apparatus for electric welding, of two arms or supports, L L', connected with a source of electric current, removable dies or holding-clamps carried by said arms, and means whereby said arms may be pressed toward one another, as and for the purpose described.

6. The combination, in an apparatus for electric welding, of clamps or holders for grasping the pieces to be welded, connections from said clamps to a suitable source of electric current, and an adjustable spring, or its equivalent, as described, for adjusting the force with which the pieces are pressed toward one another during the operation of welding.

7. In an apparatus for electric jointing of metal wires, bars, &c., a primary feeding-line connected to any suitable source of current and controlled by a switch, and a secondary fusing or welding circuit connected to the pieces to be welded, and which are held in pressure contact, together with suitable means of transfer of energy from said primary line to the circuit of the fusing or welding apparatus, as described.

8. The art or process of electric welding, consisting in applying to suitably guided and clamped pieces to be joined a powerful electric current at the junction simultaneously with a pressure, whereby upon incipient fusion at the joint a complete union is effected.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 23d day of March, A. D. 1886.

ELIHU THOMSON.

Witnesses:
W. O. WAKEFIELD,
E. H. KITFIELD.

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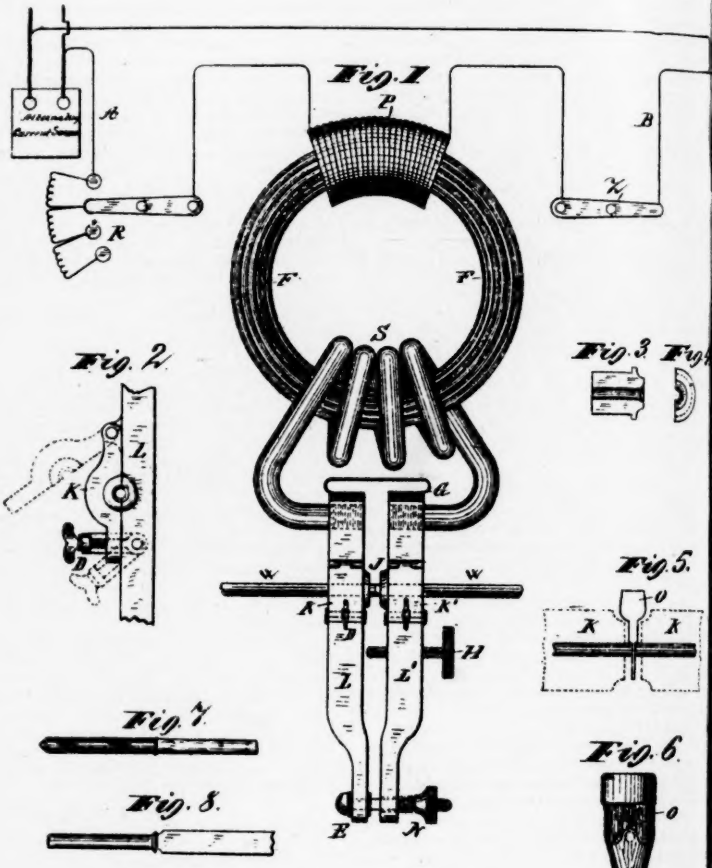
Defendant's Exhibit No. 2

(No Model.) 2 Sheets—Sheet 1.

E. THOMSON

APPARATUS FOR ELECTRIC WELDING.

No. 347,141. Patented Aug. 10, 1886.



WITNESSES:

Gabriel J. W. Gylsler

Wm. H. Capel

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1027

(No Model.) 2 Sheets—Sheet 2.

E. THOMSON.

APPARATUS FOR ELECTRIC WELDING.

No. 347,141. Patented Aug. 10, 1886.

Fig. 9.

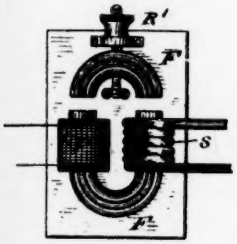


Fig. 10.

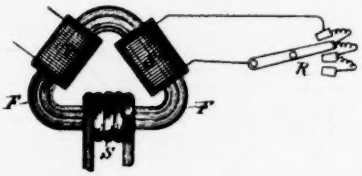


Fig. 11.

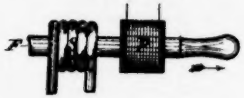


Fig. 12.

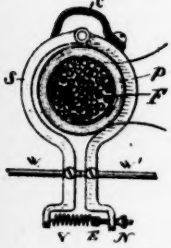


Fig. 13.



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INVENTOR

Elihu Thomson

BY

H. L. Townsend

ATTORNEY

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

APPARATUS FOR ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 347,141, dated August 10, 1886.

Application filed March 20, 1886. Serial No. 195,994. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Apparatus for Electric Welding, of which the following is a specification.

My invention relates to an improved apparatus for the practice of a new process or art of welding by electricity, which forms the subject of a separate application for patent.

The object of my invention is to facilitate the operation and provide for its control.

It consists of a regulable source of current provided with an induction apparatus, to be presently described, and also of a means for easily clamping the pieces to be welded and of setting them in position.

Figure 1 shows my improved apparatus; Fig. 2, a clamp for quick work in clamping and unclamping pieces to be joined and that have been joined or welded. Fig. 3 shows the form of one of the removable clamping-blocks for wire; Fig. 4, another view of the same; Fig. 5, a stop for insuring proper placing of the pieces to be jointed. Fig. 6 is another view of the same. Fig. 7 is one example of the work that can be accomplished. Fig. 8 shows another example of the same.

A B, Fig. 1, are wires leading from a source of alternating electric currents to the coil of insulated wire P, wound around a ring-shaped iron core, F F, as shown. The coil P has a number of turns, depending on the electro-motive force and current supplied to it, its convolutions being usually numerous when used with average electro-motive forces and current-strength. The connections of A and B to P is made so that a variable resistance, R, (or the equivalent may be substituted for it,) may be inserted in greater or less amount, so as to vary the force of the primary circuit-current in the coil P, and the switch Z permits of rupturing such circuit at will. Around the same iron core F F are also wound a few turns of heavy copper cable S, giving an almost inappreciable electrical resistance. The ends of the secondary coil are attached each to one of a pair of clamp-bearing arms or blocks, L L', of good conducting metal, relatively placed and guided so as to have only a slight movement toward and from each other. For such purpose an insulated flexible plate, as at G, may be used in conjunction with an insulated pillar borne by L at E, and passing through a hole in L'. A nut, N, and compressed spring S strung on said pillar permit said pillar to be used for drawing arms L L' toward each other with a pressure depending on the position of the nut N. The clamps K K' are placed opposite one another on arms L L', respectively, and a screw, H, serves as needed to force arms L L' apart and hold them so separated. The clamps K K' are made so as to hold in place the replaceable divided dies or sleeves for holding wires or other pieces near the point of welding or juncture.

In order to manipulate the clamps rapidly, they are preferably made as in Fig. 2, where the body K is hinged to L, and the free end arranged to be set or clamped by a movable clamp-screw in a swinging frame, D, as shown.

The dotted lines show the parts contained. The removable parts surrounding the wire or bar to be welded are like Figs. 3 and 4, and are made of copper or other good conductor in halves, the size of interval bore being nearly equal to the dimensions of the bar to be clamped, and such bore is somewhat countersunk, preferably at the end where the wires, W W', to be jointed are abutted at J, Fig. 1. The wires or bars W W' should be set projecting a little from the clamp-blocks when abutted, and to secure this I have devised a stop-plate, O, Fig. 5, for insertion between the clamping-blocks K K', as indicated, such plate O having a thin portion against which the wires may be abutted, and a thicker portion immediately above for insertion between the clamp-blocks, so as to determine their distance apart during the insertion of the wire. The removal of O leaves the wires free to abut and yet project some little distance from the clamps.

Fig. 6 shows the stop-plate O on its flat side, while in Fig. 5 it is seen edgewise.

The operation of my apparatus is as follows: The wires or bars W W', of iron, steel, German silver, brass, copper or its alloys, &c., having been inserted into the clamps by the aid of the plate O or without it, and the screw H, Fig. 1, turned back, so as not to in-

nates with the approach of L L', under the action of the spring under the nut N, the which I is momentarily closed to permit alternating currents to flow in coil F. There results very heavy currents in S, which traverse the junction or electrical ends of W W', projecting from the clamps. The locomotive result in partial fusion of such ends and unites into one piece by the force of the spring under I. Suitable adjustments of current and clamping pressure are readily made to suit the size of bars or wires and their conducting power, so as to fuse or electrically weld them. Joints of steel with steel or iron are thus easily formed, or with German silver or brass, or of brass with brass, or with iron, steel, or German silver, &c.

Other means of regulating the current given out by S may be used, some of which are indicated in Figs. 9, 10, 11, 12, and 13.

In Fig. 9 the iron core F is divided, and one portion is made movable toward and from the other, so as to more or less completely close the magnetic circuit of the core by a regulating screw, N', or the like.

In Fig. 10 the core has another coil, F', wound on it, in the circuit of which a variable resistance, R, may be inserted or cooled. This coil F', when on short circuit, will nearly annul F in any effect in S, but when on open circuit will give to S its full power, and with varying resistance in its circuit the current induced in S will vary. Its effect is similar to placing a closed tube of copper of greater or less dimensions around the core or parallel to the secondary S.

In Fig. 11 the core F is made movable to and out of the axis of S, to vary the current generating inductive currents in S.

In Figs. 12 and 13 the core F is surrounded by the primary coil P, as shown, and is of such diameter that a single band of copper, S, also forms the secondary, and whose position as regards the coil P and core F may be changed from the maximum position shown to any other. In this case the halves of the band S may also replace the arms L L' by hinging them, as shown, and providing a fastening and connection or shunt, C, around the hinge-joint. The wires W W', or bars to be joined, are held clamped by clamp-screws, and are pressed together by an adjustable elastic spring, Y, which is prevented from making connection between the separated ends of the band S by insulation, as at R.

Other methods of regulating the discharge of currents may be used, and my invention is not limited to such particulars.

What I claim as my invention is—

1. In an apparatus for electric jointing or welding, a source of heavy currents and means for regulating the same, in combination with devices for holding the pieces to be welded, and with a means of impressing a pressure resulting in force such pieces together.

2. In an apparatus for electric jointing or welding, the combination, with devices for holding pieces to be welded, of a coil wound upon an iron core and connected with a source of electricity, a secondary coil or circuit of low resistance, connections from said secondary coil to the holding devices, and means for varying the magnetic inductive effects of the core upon the secondary, as and for the purpose described.

3. In an apparatus for electric jointing or welding, the combination, with devices for holding the pieces to be welded, of an inductorium apparatus wound with two coils, one of low resistance as compared with the other, connections from the low resistance coil to the holding devices, and a source of electric currents connected with the coil of comparatively high resistance.

4. The combination, with the clamping blocks and means for connecting the same with a source of electricity, of a coil placed, (1,) having a fixed position, against which the parts to be welded may be abutted, and a movable position, against which the clamp-blocks may abut, so as to determine their distance apart in the operation of inserting parts to be welded.

5. In an apparatus for electric welding, a regulable source of current of electricity and means of passing the same through the pieces to be welded and across their surfaces of contact, in combination with means for exerting a regulable pressure upon such surfaces, as described.

6. An apparatus for electric welding, consisting of a primary coil fed by alternating currents, means for regulating the effect of said currents upon the secondary coil to indefinite relative extents, clamps for holding the pieces to be joined, to act in contact with each other at the point of junction, and means for pressing said pieces together at the point of junction, as described.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 19th day of March, A. D. 1888.

ELIHU THOMSON.

Witnesses:
W. O. Wadsworth,
S. N. Emmons.

Defendant's Exhibit No. 3

(No Model.) 4 Sheets—Sheet 1.

N. DE BENARDOS & S. OLSZEWSKI.

PROCESS OF AND APPARATUS FOR WORKING METALS BY THE DIRECT APPLICATION OF THE ELECTRIC CURRENT.

No. 363,320. Patented May 17, 1887.

Fig. 1.

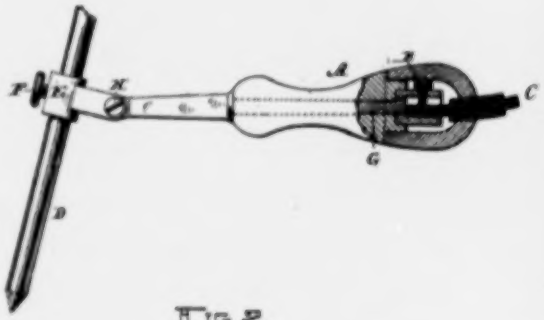
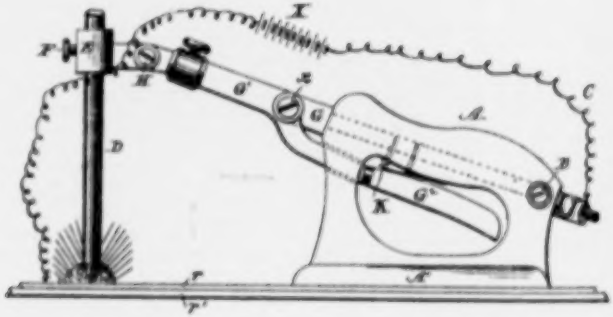


Fig. 2.



Witnesses.
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by Macmillan Bartlett
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(No Model.) 4 Sheets—Sheet 2.

N. DE BENARDOS & S. OLSZEWSKI.

PROCESS OF AND APPARATUS FOR WORKING METALS BY THE DIRECT APPLICATION OF THE ELECTRIC CURRENT.

No. 363,320. Patented May 17, 1887.

Fig. 3.

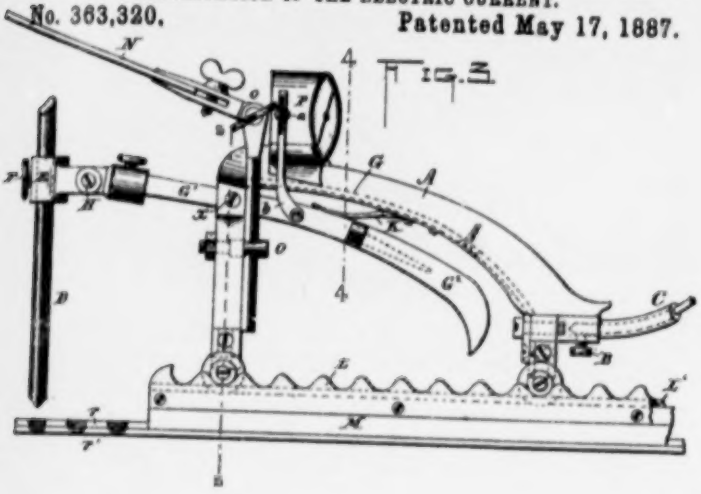
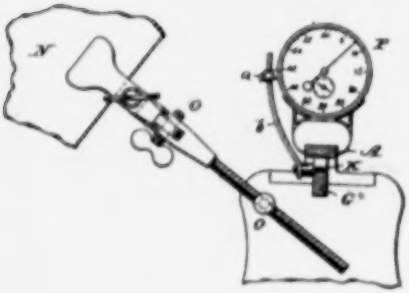


Fig. 4.



Witnesses.
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Inventors.
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1032

(No Model.) 4 Sheets—Sheet 3.

N. DE BENARDOS & S. OLSZEWSKI.

PROCESS OF AND APPARATUS FOR WORKING METALS BY THE DIRECT APPLICATION OF THE ELECTRIC CURRENT.

No. 363,320. Patented May 17, 1887.

Fig. 5.

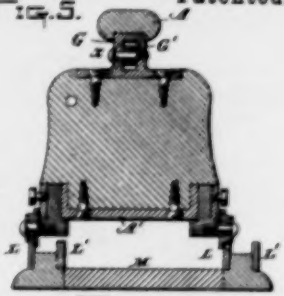


Fig. 8.

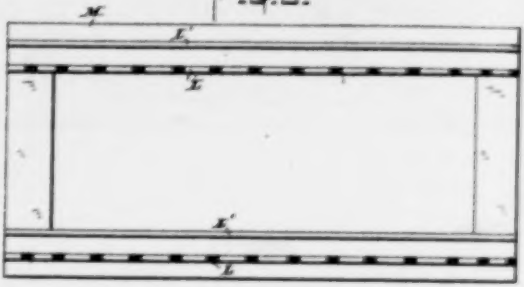
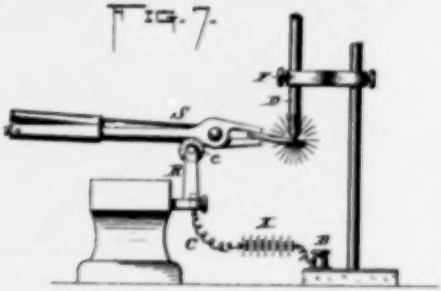


Fig. 7.



Witnesses.
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Marcus A. Curtis

Inventors.
Nicholas de Benardos
& Stanislas Olszewski
by Munn & Co Bailey
attorneys

1033

(No Model.) 4 Sheets—Sheet 4.

N. DE BENARDOS & S. OLSZEWSKI.

PROCESS OF AND APPARATUS FOR WORKING METALS BY THE DIRECT APPLICATION OF THE ELECTRIC CURRENT.

No 363,320. Patented May 17, 1887.

Fig. 8.



Fig. 8.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.

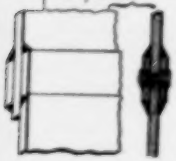


Fig. 14.

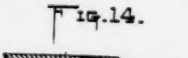


Fig. 15.

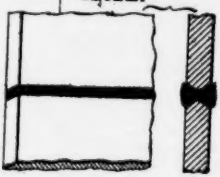


Fig. 16.



Fig. 17.

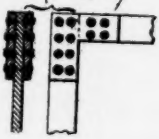


Fig. 18.

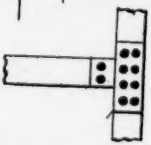


Fig. 19.



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Fig. 20

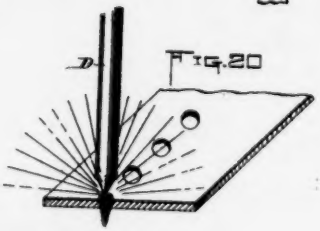


Fig. 21.



Witnesses.

Inventors.

Nicholas de Benardos
& Stanislas Olszewski
by Munday Evarts & Bailey
attorneys

UNITED STATES PATENT OFFICE.

NICHOLAS DE BENARDOS AND STANISLAS OLSZEWSKI, OF ST. PETERSBURG, RUSSIA.

PROCESS OF AND APPARATUS FOR WORKING METALS BY THE DIRECT APPLICATION OF THE ELECTRIC CURRENT.

SPECIFICATION forming part of Letters Patent No. 363,320, dated May 17, 1887.

Application filed December 3, 1885. Serial No. 184,575. (No model.) Patented in France October 10, 1885, No. 171,596; in Belgium October 20, 1885, No. 70,569; in England October 21, 1885, No. 12,984; in Germany November 1, 1885, No. 38,011; in Sweden November 6, 1885, No. 726; in Russia December 31, 1886, No. 11,982, and in Spain January 5, 1887, No. 10,267.

To all whom it may concern:

Be it known that we, NICHOLAS DE BENARDOS and STANISLAS OLSZEWSKI, of St. Petersburg, in the Empire of Russia, have invented certain new and useful Improvements in the Process of and Apparatus for Working Metals by the Direct Application of the Electric Current, (for which we have obtained patents as follows: in France, No. 171,596, dated October 10, 1885; in Belgium, No. 70,569, dated October 20, 1885; in England, No. 12,984, dated October 21, 1885; in Russia, No. 11,982, dated December 31, 1886; in Sweden, No. 726, dated November 6, 1885; in Spain, No. 10,267, dated January 5, 1887, and in Germany, No. 38,011, dated November 1, 1885,) of which the following is a specification.

Our invention contemplates the formation or production of the voltaic arc between the metal to be operated on and a conductor which is brought for said purpose into proper proximity to that point on the metal which is to be operated on, the conductor forming one pole, while the metal to be worked constitutes in itself the other pole. In other words, the metal to be worked and the conductor extraneous to said metal constitute two electrodes or terminals, by the approach of which to each other the circuit in which both are included can be completed through the voltaic arc produced between them. It is this feature which mainly characterizes our invention, and which differentiates it from other methods which have been proposed of working or melting metals by the electric current.

The advantages attending our invention are, briefly stated, its simplicity and efficiency, as well as its wide range of application in the industrial arts.

The only apparatus needed to put this invention into practice outside of the electrical generator or source of electrica supply, and the circuit leading therefrom to the metal to be worked and to the extraneous conductor, is a holder for the said conductor, the holder and the metal to be operated on being so arranged as to be movable relatively to each other, so as to bring the conductor opposite to any desired point on the metal. We prefer, usually, to move the conductor-holder over the metal. The conductor preferably consists of a stick or cylindrical rod of carbon. The form and material of said conductor, however, are not essential features.

In the accompanying drawings we have shown some forms of apparatus, which we will now proceed to describe, in order to more fully explain the manner in which our process can be practically applied

Figure 1 is a side elevation, partly in section, of a simple form of carbon-holder. Fig. 2 is a like view of a holder adapted to rest upon and be moved over the face of the metal plate or plates which are to be operated on. Fig. 3 is a side elevation of a modified form of apparatus. Fig. 4 is a section on line 4 4, Fig. 3. Fig. 5 is a section on line 5 5, Fig. 3. Fig. 6 is a plan of the rails on which the holder shown in Fig. 3 is mounted. Fig. 7 is a side elevation of a form of apparatus in which the carbon is stationary and the metal to be operated on is movable under the carbon. Figs. 8 to 21 represent various applications of the invention or uses to which it may be put.

The holder shown in Fig. 1 consists of a wooden or other non-conducting handle, A, having in its rear end a socket and binding-screw, B, electrically connected to the conducting stem or shank G, to which is jointed or hinged at H a sleeve, E, containing the carbon pencil D, held in place therein by clamp-screw F. The binding-screw B serves to hold in place the metallic conductor C, which leads from one pole (usually and preferably the + pole) of the source of electricity. The other pole of said source of electricity is connected to the metal to be operated on. When the carbon D, under these conditions, is brought into proximity to the metal to be operated on, the voltaic arc will be produced between the two, with the effect of heating, softening, and finally melting the metal at the point where the arc meets it. The holder can be moved over the metal from one point to another to

act on it in a continuous line, or at separate points, as desired.

The apparatus shown in operation in Fig. 2 consists, also, of a wooden handle, A, with a metallic socket and binding-screw, B, at its rear end, metallic shank G, jointed sleeve E, clamp-screw F, and carbon pencil D, as in the preceding figure. Handle A has a flat base, A', which rests upon and can move over the two metal plates *r r'* to be operated on. The conductor C for the carbon leads from the + pole of battery X, (typical of any source of electricity, such as accumulator, battery, or dynamo,) and the other pole of said battery is electrically connected to said plates *r r'*, as shown.

The stem G is a two-part stem jointed together at *x*, and its front end, G', is continued back of the joint in the form of a lever, G', which extends under the handle A. A spring, K, keeps the part G', and consequently the carbon D, lifted, thus maintaining a normally-open circuit. By pressing lever G' toward the handle the carbon can be lowered into proper proximity to the plates *r r'* to produce between it and them the voltaic arc. In this figure the apparatus is shown in operation uniting the two plates by a process akin to riveting. By the action of the voltaic arc the metal is gradually melted, the fusion extending through into both plates, the melted portions of which are mingled together, so that when the same cool the two plates, as to said fused portions, are virtually in one homogeneous piece.

The apparatus shown in Figs. 3, 4, 5 in the main resembles that illustrated in Fig. 2. Its base is provided with front and rear pairs of flanged wheels, which run upon either one of two pairs of rails, L L', on a track-frame, M. The rails L are cogged or toothed, as shown, and are designed to be used when the holder is employed for what may be termed "point-union"—that is to say, for operating on the metal at points whose distances from one another will be equal to the distance intervening between the teeth of the rails. The other rails, L', are ordinary straight smooth rails, and are to be used when the holder is employed for uninterrupted or continuous union. This holder is provided with a screen, N, of colored glass, attached to the holder by a universal joint at O, which will permit it to be set in any position required, in order to shield the eyes of the operator from the injurious effects of the voltaic arc. It is also provided with a secondometer or other suitable time-piece, P, having a stop-lever, *a*, connected to and arranged to be operated by an arm, *b*, attached to the handle end of vibratory stem G. Normally the handle end G' is depressed by its spring, thus lifting the carbon and breaking the circuit, and the parts are so adjusted that in this position the arm *b* will bring the stop lever to position to stop the time-piece When, however, the handle is pressed upward, thus bringing the carbon into action, the stop-lever will be moved in a direction to permit the time-piece to start. In this way the duration of the operation, in the case of point-union particularly, can be accurately determined.

It will be of course understood that, instead of connecting the wire from one pole of the battery directly to the metal to be operated on, it can be connected to a metallic plate or stand, which serves as a working-bench to support the metal operated on, the two being of course in electrical contact. Such arrangement is represented in Fig. 7, the apparatus being designed for use as a forge. The stand R is furnished with a grooved guide-pulley, *c*, which receives and supports the metal tangs or shanks of pinchers S, whose handles are sheathed with wood or other insulating material. The pinchers are in electrical contact with the metal pulley, over which they can move to bring the article held by them (in this instance supposed to be a chain-link) under the carbon, which is supported in a stationary holder. The circuit-connections are the same in the other figures. The metal to be operated on can in this apparatus be heated to the desired extent, and then can be transferred to the usual anvil and forged in the customary way.

Our invention, as hereinbefore indicated, is susceptible of a wide range of application. It can be used, for instance, for joining metals whether end to end or placed one on top of the other, for making holes in metal, or for dividing a piece of metal into two or more parts, for steelifying, and for numerous other purposes.

Figs. 8 to 19 represent some of the ways in which metals may be joined by our invention. These figures require no explanation, further than to say that the darkened points or lines in them indicate where the metal has been operated on.

Fig. 20 illustrates the manner in which holes may be bored in metals.

Fig. 21 represents a metallic plate having pattern of fused metal incrusted thereon. The plate is heated to the temperature of fusion at the point where the extraneous metal is to be applied, and said metal in fused condition is dropped upon the heated point or points, thus forming a metal incrustation, which enters and becomes part of the plate. In this way we can incorporate into the plate other metals, granite, porcelain, &c.

From the foregoing it will be observed that the essence of our invention is that the metal itself at the point where it is operated on becomes one pole of the voltaic arc, while the carbon or other extraneous conductor approached thereto constitutes the other pole.

Having now described our invention and the best way at present known to us of carrying the same into effect, what we claim, and desire to secure by Letters Patent, is as follows:

1. The improvement in the art of joining or

separating metals by means of the directly-applied electric current, which consists in forming the voltaic arc at the desired point or points, or along the desired line or lines, on said metal by a conductor approached thereto, which constitutes one pole, while the metal itself constitutes the other pole, as and for the purposes hereinbefore set forth.

2. The process of topically working plates, blocks, or other solid masses of metal, which consists in forming the voltaic arc at those points only of the metal which are to be worked, (leaving the other portions of the same unaffected,) through the agency of an extraneous conductor, which constitutes one pole, while the metal itself constitutes the other pole, as and for the purposes hereinbefore set forth.

3. The carbon-carriage consisting of a frame adapted to rest on and move over the face of the metal to be worked, a carbon or other conductor, a holder therefor carried by said frame and movable to and from the metal on which the frame rests, and means whereby said holder can be actuated, at will, to cause the carbon to approach or recede from the said metal, substantially as hereinbefore set forth.

4. The combination of the supporting-frame, the carbon-holder carried by and movable and adjustable on said frame, and the time-piece connected with and operated by said holder at the times and in the manner substantially as and for the purposes hereinbefore set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

NICHOLAS DE BENARDOS.
STANISLAS OLSZEWSKI.

Witnesses:
NICHOLAS TSCHEKALOFF.
FREDERICK KAUPE.

Defendant's Exhibit No. 4 1037

(No Model.)

E. THOMSON.

METHOD OF ELECTRIC RIVETING.

No. 396,015. Patented Jan. 8, 1889.

Fig. 1.

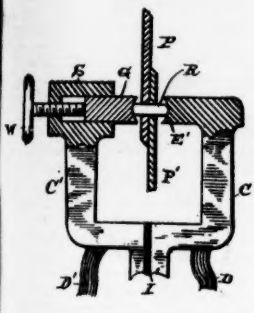


Fig. 2.

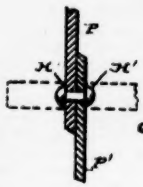


Fig. 3.



Fig. 4.

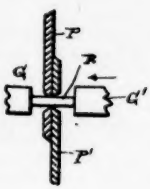


Fig. 5.

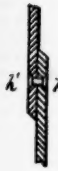


Fig. 6.

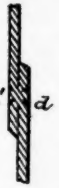


Fig. 7.



Fig. 8.



Fig. 9.

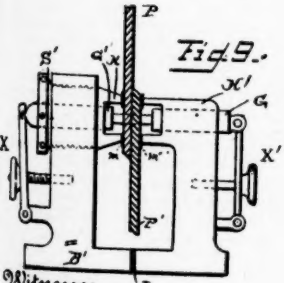
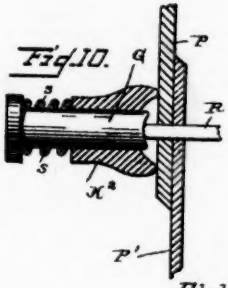


Fig. 10.



Witnesses.
Chas. R. Steward
Thos. A. Cooper

Inventor
Elihu Thomson
By his Attorney
H. L. Townsend

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

METHOD OF ELECTRIC RIVETING.

SPECIFICATION forming part of Letters Patent No. 396,015, dated January 8, 1889.

Application filed October 12, 1888. Serial No. 287,910. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Improved Method of Electric Riveting, of which the following is a specification.

My invention consists, essentially, in a method of riveting by placing the rivet or rivet-blank in position in the socket or hole designed to receive it, passing through said rivet an electric current of sufficient volume to heat the same to the requisite temperature, and then setting the rivet in its position by endwise pressure or other means employed in ordinary riveting operations.

In carrying out my invention I may swage or form both heads after the heating of the rivet-blank in position in the work, or may swage or form one head only, the rivet having been inserted with one head ready formed. The heating of the rivet when in position may be carried only to the point sufficient to permit it to be set by swaging or heading its ends, or the current may be allowed to pass for a longer period and until the central portion of the rivet, as well as the metal near thereto, is raised to a welding temperature, when the application of pressure expanding the rivet in its seat will weld the same to the metal surrounding it, and the application of pressure to the pieces to be riveted will weld them together around the rivet. In some cases I may cause the electric current to flow across from piece to piece of the parts to be riveted, as well as through the rivet itself.

Detail processes forming a part of my invention will be more particularly specified in the claims.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation and partial section of a form of apparatus suitable for carrying out my method of electric riveting. Fig. 2 is a view of the rivet after the operation has been effected. Figs. 3 and 4 illustrate modifications in the manner of practicing the invention. Figs. 5, 6, 7, and 8 are illustrations of the work accomplished. Fig. 9 is a side elevation of an improved form of apparatus which may be used in practicing my present invention. Fig. 10 shows a further modification.

In Fig. 1, P P' indicate two plates of metal—such as boiler or sheet metal—to be secured together by means of a rivet placed in a hole passing through lapped portions of the plates.

C C' indicate two blocks or pieces of material adapted to conduct an electric current and made sufficiently massive to permit the current of large volume required in the operation to pass without becoming unduly heated.

The electric current required is conveyed from any source—such, for instance, as that described in my previous patent, No. 347,140—to the blocks C C' by means of cables D D', or by other means, and the blocks are insulated from one another, as indicated at I, in order to prevent the current of the cables from short-circuiting around the work. Supported upon the head S of the block C', and in electrical connection therewith, is a plunger G, whose end is of the nature of a swaging tool or die, and which may be forced against the work by means of a screw, W. Formed upon or attached to the block C, and in electrical connection with the source of current, is another receiving block or anvil, E', for one end of the rivet. The faces or ends of the blocks G E' are in line with one another, and are adapted to receive the rivet R between them. The contour of their swaging, forming, or holding ends may be considerably varied, according to the special manner of securing the rivet in place which it is desired to employ. In the form shown in Fig. 1 the end of G is made concave to receive and fit over the end of the rivet-blank and to operate as a means of swaging a head upon the rivet-blank. The other block, E', is similarly formed for a similar purpose.

In employing the apparatus described the blocks or pieces G E' are brought to bear upon the rivet or rivet-blank R, which has been previously inserted into the hole through the plates, the ends of said blocks receiving the ends of the rivet or rivet-blank between them. Electric current is now turned on and made to pass through the rivet or blank in sufficient volume to heat the rivet to a softened condition, after which endwise pressure or other force is applied through the plunger G—as, for instance, by means of screw W. This will firmly seat and expand the rivet in

10339

its hole, and will at the same time form heads at opposite ends of the rivet-blank, or at one end thereof only, if, as indicated in Fig. 3, a rivet with a head already formed has been inserted into the hole previously to the riveting operation.

Fig. 2 illustrates the condition of things at the completion of the operation, the rivet being there shown as set.

In Fig. 3 the rivet is shown as having one head formed on it before being inserted into the hole bored or punched for the purpose. The other head is formed at E' by the movement of the clamping piece or plunger G' after the current has heated the metal to the desired temperature.

Fig. 4 simply illustrates the fact that two plungers, G G', might be employed and moved in opposite directions or toward the rivet-blank R after the blank is sufficiently heated. This figure also shows that the holes punched or bored in the plates may be countersunk, so that the riveted heads may not protrude from the plates.

Fig. 5 shows two plates riveted in this manner, the rivet fitting solidly into the countersunk holes, as shown at *h h'*.

A valuable effect, (illustrated in Fig. 6,) not possible in other processes, may be obtained in my method of riveting by continuing the heating of the rivet-blank placed in the hole for some moments longer than is necessary to raise it to a softening temperature. By continuing the heat is carried to the portions of the plate surrounding the rivet, raising such portions to a welding temperature, and when the rivet is pushed firmly into the hole a partial welding of the rivet to the sides of the hole is effected, thus forming practically solid metal for a portion of the distance from *h* to *h'*.

Fig. 7 shows a similar effect, which occurs when the rivet-heads are not forced into countersunk holes, but are allowed to protrude from the plates.

Fig. 8 shows a modification where one head of the rivet is allowed to protrude from the plate, the other end fitting solidly and evenly into the countersunk hole bored to receive it.

Fig. 9 shows a modified form of apparatus which is found useful in carrying out my improved method of electric riveting, and which is an improvement over that of Fig. 1, inasmuch as it can be used to force the plates together before the current is put on and keep them together while the rivet is heated and secured in place. K K' are heavy clamping-pieces having a common bed or support, B', and one or both provided with a screw, S'. By means of screw S' the clamping device K K' may be forced hard against the plates P P', as shown in the figure, thus making a firm contact where the metals are lapped over each other.

The plungers or formers G G' are mounted in the clamp-heads, and are operated by means of the screw-nuts X X' bearing upon levers connected to the plungers. By the use of this form of apparatus a heating electric current might be passed through the metal plates themselves at parts around the rivet by means of the pressure pieces or clamps K K'. Such current would assist in raising the portion of the plates immediately surrounding the rivet to the welding temperature; but the prime object is that through the application of the pressure the plates themselves may be held together during the riveting. The blocks K' K may therefore be faced with mica or other insulator, *m m'*.

Fig. 10 shows a modification of the just-described apparatus. G is one of the plungers which is used to convey the current to the rivet R. K^2 is a heavy piece of metal, so arranged as to press against the plates P P'. Pressure is applied to piece K^2 from the plunger by the springs *s s*.

It will be seen that by my improved method of electric riveting a large amount of labor is overcome and much time is saved. The heating of the rivet can be accomplished in a very few seconds, the time depending on the power of the electric apparatus supplying the current. It is also obvious that the inconvenience of transporting hot rivets from the forge to the hole in the boiler or other plates is avoided in my present invention. The superior advantage, also, of partially welding the rivet to the plate is obvious.

I have described some of the forms of apparatus that may be used for carrying out my invention; but it will be readily understood that the same method might be practiced by using other devices.

While I have described the riveting of the blank after heating as being performed by means of the blocks through which current is applied to the rivet or blank, it is obvious that the invention might be practiced by withdrawing said blocks after the rivet has been heated to the desired degree, or by applying the current through any other means, and then heading the rivets by any desired means.

I have not herein claimed the apparatus described, as my present patent is for the novel art or process, whether practiced by means of the apparatus described or any other suitable apparatus.

What I claim as my invention is—

1. The herein-described improved method of riveting, consisting in heating the rivet or rivet-blank electrically while in place, and then heading either or both ends of the same.

2. The herein-described method or process of riveting, consisting in making the rivet while in position a portion of a circuit carrying a heating or large volume of electric current, and then setting the rivet by any desired means, as and for the purpose described.

3. The herein-described method of riveting, consisting in passing a heavy electric current through the rivet or rivet-blank while the

same is in position, and then applying end-pressure to the rivet to set the same.

4. The herein-described method of riveting, consisting in applying to opposite ends of the rivet while in position suitable metal blocks or pieces, either or both movable, including said blocks and rivet in an electric circuit carrying an electric current of large volume for the purpose of heating the rivet, and then forcing said blocks or pieces toward one another to set the rivet.

5. The herein-described method of riveting, consisting in heating the rivet while in place by an electric current until it assumes a welding temperature, and then applying pressure to set the rivet in its seat and unite the sides of the same to the metal body through which it passes.

6. The herein-described method of fastening two pieces of metal together, consisting in passing a heating electric current throu a rivet or rivet-blank, passing through t pieces as well as through the pieces of met themselves in the neighborhood of the rive and applying pressure to set the rivet a weld the pieces together.

7. The herein-described method of electr riveting, consisting in pressing the plates t gether, heating the rivet inserted through t plates by a heavy electric current flowin through the same, and applying end-pressu to the rivet to head or set the same.

Signed at Lynn, in the county of Ess and State of Massachusetts, this 10th day October, A. D. 1888.

ELIHU THOMSON.

Witnesses:
CHARLES G. STONE,
OTIS K. STUART.

Defendant's Exhibit No. 5 1041

(No Model.)

M. W. DEWEY.

METHOD OF ELECTRIC RIVETING.

No. 432,727. Patented July 22, 1890.

Fig. 1.

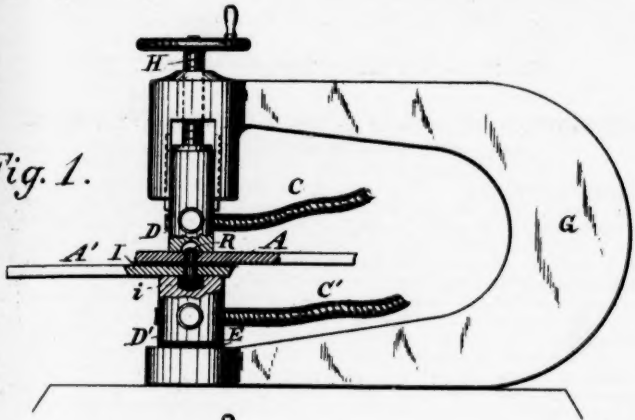


Fig. 5.



Fig. 2.

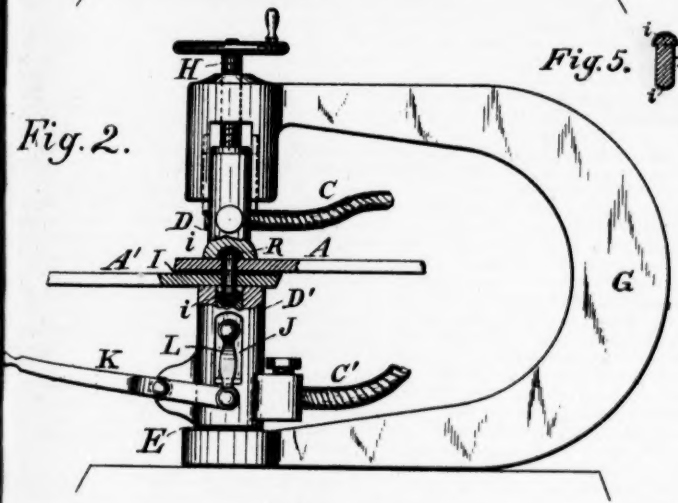




Fig. 3.



Fig. 4.

WITNESSES:

E. L. Bendyson

J. J. Laass.

INVENTOR:

Frank W. Dewey

BY

Dull, Laass & Dull

ATTORNEYS

UNITED STATES PATENT OFFICE.

MARK W. DEWEY, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE [illegible] CORPORATION, OF SAME PLACE.

METHOD OF ELECTRIC RIVETING.

SPECIFICATION forming part of Letters Patent No. 620,727, dated July 28, 1899.

Application filed April 24, 1899. Serial No. 714,271. (No model.)

To all whom it may concern:

Be it known that I, MARK W. DEWEY, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Method of Electric Riveting, (Case No. 57,) of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to electric riveting, and is a method or process consisting, essentially, in interposing insulating material between the pieces or plates to be riveted together, then inserting the rivet into the rivet hole or holes, and then passing a heating electric current through and between the plates and rivet.

The object of my invention is to confine the current in its passage between the metal blocks or riveting-tools forming the terminals of an electric circuit to the rivet and metal body through which it passes, or, in other words, to direct or guide the current in a certain path through the work that will tend to produce more effective and economical results than heretofore.

In the usual methods of electric riveting heretofore employed the metal pieces or plates to be riveted together were laid one upon the other without insulating material between them, and then punched or drilled and the metallic rivet inserted in the rivet hole or holes. The metal blocks or terminals of an electric circuit were then brought into contact with the ends of the rivet and the current allowed to pass through said rivet and plates until the ends of the rivet were sufficiently softened, when it ceased by pressure applied to its ends to form heads. The rivet was in direct contact with the electric terminals, and also with the plates through which it extended, and the current in its passage between the terminals naturally expanded and divided when it reached the plates, except at the projecting ends of the rivet in contact with the terminals. The ends alone of the rivet, therefore, were sufficiently heated, and the portion of the rivet-shank within the holes in the plates remained comparatively cool, as it received but a small part of the current and did not become properly welded or united to the walls of the rivet-hole. Consequently it was very common to form heads on the ends of the rivets by pressure in order to secure the plates together. It will be seen that a large part of the current was wasted by this method, especially when it was desired to unite the ends of the rivet to the metal body through which it passed, as the current had to pass through the work a long time. It is essential that the riveting operation be done as quickly as possible; otherwise, as the plates have usually good radiating surfaces and good conductivity, the heated will be rapidly dissipated as wasted.

It will be apparent from the above that heretofore an electric riveting operation depended largely upon the resistance derived by the ends of the rivet, as the portion within the hole, with the metal body surrounding and in contact with it, formed a path for the current of very low resistance, which became heated, if heated at all, only by the conduction of heat from the highly-heated ends of the rivet. By my improved method I confine the current passing between the metal blocks forming the terminals of the circuit, to a path of high resistance, so that the rivet-shank within the hole and the walls of the hole are both raised to a welding temperature at or completely united. The expansion of the rivet-shank and the metal body surrounding it, produced by the heat of the current, allows sufficient to effect the union of the parts without pressure of any kind. Nevertheless, if desired, suitable pressure may be applied also, as when a heading operation is required. A heading operation is not necessary with my process, as the rivet is firmly welded to the metal body or plates throughout its length and they become one piece, thus saving of heading and countersinking.

It has been proposed, in order to confine the current to the rivet, to cover the rivet-shank with insulating material, but this effectually prevents the union of the rivet with the metal body, and the plates are held together only by the rivet-head, which is objectionable.

In practicing my improved process I first coat the surfaces of one of the plates in a suitable manner or all plates when [illegible]

as a core is in contact with the other plate, [illegible] melting material—such as a mineral paint, oil, or an oxide, or an enamel. Then the rod E is inserted in the hole therein, and the terminals of the electric circuit are brought in contact with the back sides of the plates, preferably at points near and surrounding the ends of the rivet, which latter is inserted from said terminals in any to and manner. By this arrangement the current is passed from one of the terminals or metal blocks holding or pressing the plates together into one of the plates in the vicinity of the rivet from the said plate to and through the rivet to the other plate, and then from the latter plate to the vicinity of and rivet to the other terminal or metal block. The method may be practiced by means of apparatus varied in form and construction and different from that shown in the drawings, although this is suitable for carrying out my method.

In the accompanying drawings, Figure 1 represents an elevation of apparatus for riveting by my method, and Fig. 1 is another form to be employed when pressure is applied to the ends of the rivet. Fig. 3 is a sectional view of the plates and rivet after the operation has been effected. Fig. 4 is a sectional view of the plates after the insulating material has been applied and the holes drilled, but before the plates are placed together and the rivet inserted in position; and Fig. 5 is a section of rivet having insulating material on its ends.

Like letters of reference indicate corresponding parts.

Referring now more particularly to the drawings, A and A' indicate two metal plates to be secured together by means of a rivet B, placed in a hole or holes passing through lapped portions of the plates having insulating material I between them, and D and D' indicate two metal blocks or terminals of a suitable electric circuit out of sufficient size to conduct a current of large volume without heating greatly heated thereby.

The heating-current employed may be the kind from any suitable source—as by the use of the dynamo in my prior patent, No. 469,211, dated April 26, 1892. The current is conveyed by means of cables of good conductivity C and C' to the blocks D and D', which are insulated one from the other as shown at E, to prevent the current short-circuiting around the rivet. The metal block D is in the shape of a plunger supported by the end of the upper arm of the frame G and may be raised and lowered upon the work as found necessary by means of the screw H. The block D' is stationary, forming an anvil, is connected with the cable C', and is fixed to the bottom of the lower arm of the frame. The conducting-blocks D and D' are similar to and opposite each other, so that D is movable toward and from block D'. After the plates are placed in position and the rivet inserted the upper block D is forced down by means of the screw H upon said plates to hold or press them together and at the same time make good electrical connection with the rivet. The upper block D is followed up as the rivet is upset with its end of the rivet, and the lower block is also followed up in a similar manner, but for convenience the latter is kept in contact or nearly in contact with same by means of the insulating material I. In Fig. 1 the upper block is shown fitted with insulating material. When the said blocks are in position the current is closed, a full and even amount of the insulating material between the plates and the insulation at the ends of the rivet, the current is passed through the plates and rivet-block, as before mentioned, effecting a thorough union of the sides of the rivet to the plates or metal body surrounding it, gradually closing it as in Fig. 3. When it is desired to upset or head the rivet slightly outwardly, I may be provided to work in the block D', as shown in Fig. 3 of the drawings, by means of a pivoted lever G, coupled at one end to said plunger D, as at D', and at the other end to a link L. By depressing the handle of the lever G the plunger D is lifted and pressure is applied to the end of the rivet to upset or head the rivet or to perfect the union of the parts. The tapping surfaces of said plates may be coated with the insulating material I, but it would have to be cut away or removed to fit the plunger D and the anvil D' to adhere to the purposes of my invention.

It will be obvious that an ordinary electric riveting apparatus may be employed and the current passed through the rivet and plates if heated and with good results, but the insulating material is interposed between the plates. Instead of using a rivet with both ends and placing insulating material on the blocks close to it found to make contact with the ends of said rivet, having the operation, the ends of the rivet-head are heated or covered with suitable insulating pieces or caps, as shown in Fig. 5.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. The herein-described method or process of electric riveting, consisting in interposing insulating material between the plates or plates to be riveted together, then inserting the rivet into the rivet-hole or holes, and passing a heating electric current through the rivet and plate in order to the ends of the rivet to the metal body through which it passes.

2. The herein-described method or process of electric riveting, consisting in interposing insulating material between the plates or plates to be riveted together, then inserting the rivet into the rivet-hole or holes, then passing a heating electric current into one of the plates in the vicinity of the rivet-hole, and said plate to and through the rivet to the

other plate, and then from the latter plate in the vicinity of said rivet to unite the sides of the same to the metal body through which it passes.

3. The herein-described method of electric riveting, consisting in interposing insulating material between the plates, pressing the same together and heating the rivet inserted through the plates by a heavy electric current flowing through the rivet and plates to unite the sides of the rivet to the metal body through which it passes.

4. The herein-described method of electric riveting, consisting in interposing insulating material between the plates, pressing the same together, and heating the rivet inserted through the plates by a heavy electric current flowing through the rivet and plates to unite the sides of the rivet to the metal body through which it passes, and then applying pressure to perfect the union, as desired.

5. The herein-described method of electric riveting, consisting in interposing insulating material between the plates, pressing the same together, heating the rivet inserted through the plates by a heavy electric current flowing through the rivet and plates to unite the sides of the rivet to the metal body through which it passes, and then applying end pressure to the rivet to perfect the union of said parts.

6. The herein-described method or process of riveting, consisting in interposing insulating material between the plates and heating the rivet and plates electrically while in position to weld or unite the sides of the rivet to the metal body through which it passes.

7. The herein-described method or process of riveting, consisting in interposing insulating material between the pieces or plates to be riveted together, then inserting the rivet into the rivet hole or holes, insulating the ends of the rivet, then passing a heating electric current into one of the plates in the vicinity of the rivet from the said plate to and through the rivet to the other plate, and then from the latter plate in the vicinity of said rivet, to unite the sides of the same to the metal body through which it passes.

8. The herein-described method or process of riveting, consisting in interposing insulating material between the pieces or plates to be riveted together, then inserting the rivet into the rivet hole or holes, holding the plates together by applying metal blocks on each side, insulating the ends of the rivet from the blocks, then passing a heating electric current into one of the plates in the vicinity of the rivet from the said plate to and through the rivet to the other plate, and then from the latter plate in the vicinity of said rivet, to unite the sides of the same to the metal body through which it passes.

9. The herein-described method or process of riveting, consisting in interposing insulating material between the pieces or plates to be riveted together, then inserting the rivet into the rivet hole or holes, holding the plates together by applying metal blocks on each side, insulating the ends of the rivet from the blocks, then passing a heating electric current into one of the plates in the vicinity of the rivet from the said plate to and through the rivet to the other plate, and then from the latter plate in the vicinity of said rivet, to unite the sides of the same to the metal body through which it passes, and then applying pressure to perfect the union, as desired.

10. The herein-described method or process of riveting, consisting in interposing insulating material between the pieces or plates to be riveted together, then inserting the rivet into the rivet hole or holes, and then passing a heating electric current through and between the plates and rivets, to unite the sides of the same to the metal body through which it passes.

In testimony whereof I have hereunto signed my name this 22d day of April, 1890.

MARK W. DEWEY. [L. S.]

Witnesses:
C. H. DUELL,
H. M. SEAMANS.

Defendant's Exhibit No. 6

1015

(No Model.)

C. L. COFFIN.

PROCESS OF ELECTRICALLY WELDING METALS.

No. 437,571. Patented Sept. 30, 1890.

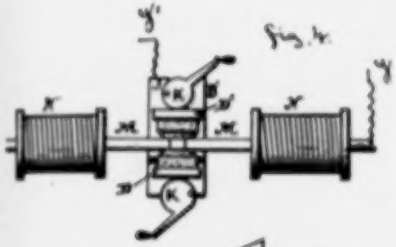


Fig. 4.

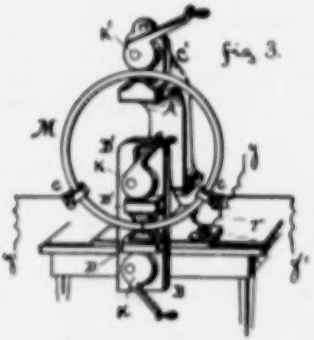


Fig. 3.

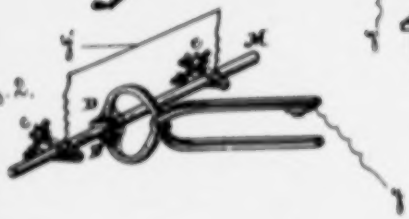


Fig. 2.



Fig. 5.

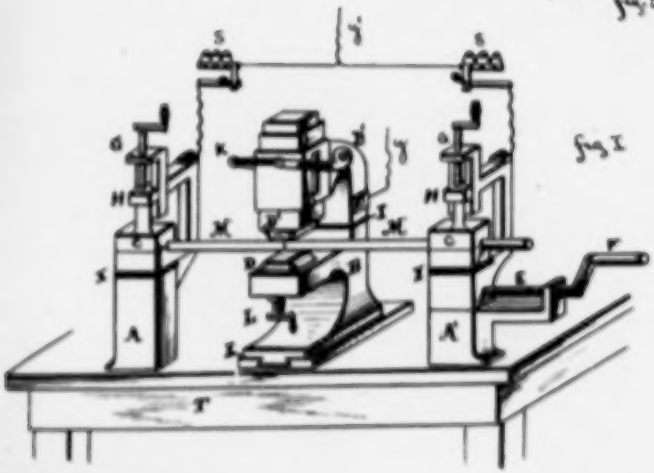


Fig. I

Witnesses:
Arnold Kotheff
Frederick P. Anderson

Inventor.
Charles L. Coffin.

1046

UNITED STATES PATENT OFFICE.

CHARLES L. COFFIN, OF DETROIT, MICHIGAN.

PROCESS OF ELECTRICALLY WELDING METALS.

SPECIFICATION forming part of Letters Patent No. 437,571, dated September 30, 1890.

Application filed April 8, 1890. Serial No. 347,115. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. COFFIN, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Process of Electric Welding and Metal-Working, of which the following is a specification.

My invention consists of an improved process of electric welding and metal-working, hereinafter fully described and claimed.

The drawings represent apparatus by which my invention may be practiced. Figures 1, 2, and 3 are perspectives, and Figs. 4 and 5 are partial elevations.

In Fig. 1, T represents a table, upon which are mounted two posts A and A', the upper part of post A' being made movable and controlled by a screw-shaft E, having a crank F. I represents insulation in all the figures. C C represent clamps supported on posts A and A', but insulated therefrom, the upper half of each clamp being movable by means of a winch G and sliding block H or in any other convenient manner. B represents a post, movably mounted on table T, carrying an anvil-block D, preferably of carbon, which is movable vertically by a screw-shaft L. B' represents a post secured to but insulated from table T, which carries a vertically-sliding head K, at the lower end of which is a conductor D', (preferably of carbon.) The post B' is connected by the conductor Y with one pole only of a generator, and the clamps C C are connected by a branched conductor Y', in which there may be resistance-switches S to equalize the resistance of the branches with the other pole of said generator. M M represent the articles to be welded together, which are clamped in the clamps C, and are supported by the anvil D, either in contact, as shown in Figs. 1, 3, and 5, or separated, as shown in Fig. 4.

In the operation of this apparatus, the articles being clamped, as shown in the figures, the conductor D' is brought down to make contact with the articles M M, and a heating-current is then passed through the conductors Y Y', traversing the articles M M and passing out through conductor D', or vice versa, by which the articles M M are heated at their point of contact with the conductor D', when they may be pressed together by the winch E F to form the weld, which may be completed by hammering, rolling, &c.

In Fig. 2 conductor D' and anvil D are both represented by one pair of tongs, which are clamped on the article M at the point where it is desired to heat said article, and the clamps C C are connected with the article M at each side of this point, being both connected by a branched conductor Y' with one pole of a generator, and the tongs D' being connected by the conductor Y with the other pole of said generator.

In Fig. 4 the arrangement is substantially the same as Fig. 1, the conductor D' being raised and lowered by an eccentric K, and a similar eccentric being substituted for the shaft L to lower and raise the anvil D''. In this figure the articles M M pass through hollow magnets N N and are not in contact, one being connected by the conductor Y with one pole only of a generator, and the conductor D' being connected by the conductor Y' with the other pole of the generator, one of the articles M being directly heated by the current and the other heated by radiation.

In Fig. 3 the apparatus of Fig. 4 is shown as applied to welding a hoop, which is held in the upper clamp C', provided with the eccentric K', and the clamps C C, which are connected with the branched conductor Y', are in this case connected with the hoop on opposite sides of the joint.

In Fig. 5 the mechanism of Figs. 3 and 4 is indicated as applied to making a lap-joint between the articles M M.

A description of the operation of Fig. 1 applies to all the figures.

What I claim as my invention, and desire to secure by Letters Patent, is—

The process herein described of welding metals electrically, which consists in bringing the parts to be welded in contact with an anvil, and a conductor, which is connected with one pole of a generator, connecting said articles with the other pole of said generator only, passing a heating-current through the articles and conductor, and pressing the articles together and forming the weld while in contact with said conductor, substantially as set forth.

CHARLES L. COFFIN.

Witnesses:
CYRUS E. LOTHROP,
GERTRUDE H. ANDERSON.

1047

Defendant's Exhibit No. 7

(No Model.)

E. THOMSON.

METHOD OF ELECTRIC WELDING.

No. 444,928. Patented Jan. 20, 1891.

FIG. 1.

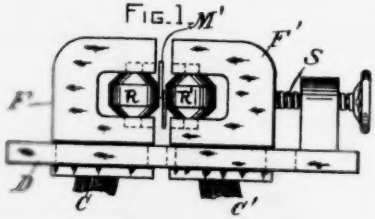


FIG. 2.

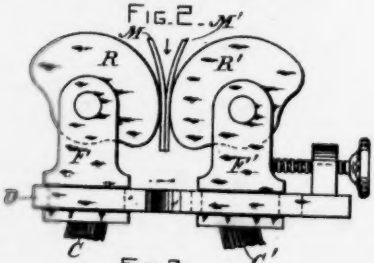


FIG. 4.



FIG. 3.

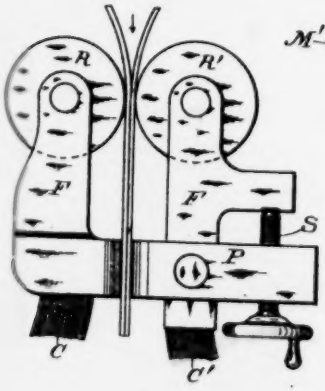
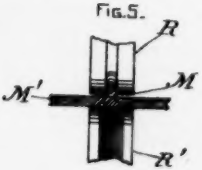


FIG. 5.



WITNESSES.

H. Hundley

- INVENTOR -

Elihu Thomson

By H. L. Townsend

Atty

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO THE THOMSON ELECTRIC WELDING COMPANY, OF MAINE.

METHOD OF ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 444,928, dated January 20, 1891.

Application filed June 14, 1890. Serial No. 355,502. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Swampscott, in the county of Essex and State of Massachusetts, have invented a certain new and useful Method of Electric Welding, of which the following is a specification.

My invention relates to a process of electric welding in which the surfaces to be welded are pressed together to from a union, and the heating of the surfaces to the desired plasticity is effected by means of an electric current passed across the joint or line of proposed union.

My present invention relates more particularly to the process of joining or welding together strips, sheets, plates, or bars of metal where it is desirable to form a joint of considerable length, and is especially applicable to the welding of plates together at their edges, instead of riveting, to the welding of ribs or strips of metals to plates for the purpose of strengthening the same, to the formation of pipes by welding a longitudinal joint, to the welding of half-round or other shaped strips on one or both sides of a plate or strip of metal, and to other similar classes of work, as will be obvious.

My present invention consists, essentially, of forming an elongated joint by the electric welding process by feeding the work in the longitudinal direction of the joint through suitable pressure devices, the work being properly arranged, so that the pressure devices will press the surfaces to be welded together and simultaneously passing an electric current through the work at the point of pressure.

In carrying out my invention I prefer to use as the pressure devices suitable rolls or segments of rolls which are included in the heating electric circuit and from which the current passes to the work and across the surfaces pressed against one another by such rolls. In combination with the rollers or similar devices I employ any usual or proper means, such as screws, levers, or other devices for forcing them toward one another. As the work is passed through such rolls with a continuous motion, each point as it comes between the rolls is heated and the surfaces pressed together by the pressure applied in a line transverse to the plane of the surfaces to be welded.

In the accompanying drawings I have illustrated, in Figures 1, 2, and 3, various forms of apparatus suitable for carrying out my invention. Fig. 4 is an edge view of two rolls of special form that may be used in carrying out my invention. Fig. 5 illustrates rolls or pressure devices of a special construction invented by me and hereinafter claimed.

Referring to Fig. 1, R R' indicate two rolls, of conducting material, which are mounted in suitable frames F F', and are supported upon but insulated from a bed-plate D. The frames F F', being of conducting material, may be connected with any suitable source of electric current of large volume through cables C C', or by other means, so that an electric current may be caused to pass from one roll to the other, and through any pieces of conducting material held between them in pressure-contact. The frame F' may be made to slide in the bed-plate D and may be forced toward the opposite roll by means of the screw S, so that the desired pressure may be applied. In this figure I have illustrated the application of my invention to the welding of the edges of two plates M M' together, the plates being shown in end view as in position between the rolls ready to be fed between them in the longitudinal direction of such plates. The edges are slightly overlapped, as shown, and the plates, being in position between the rolls, may be squeezed together by means of the screw S, thus forming an electric contact between them. The electric current being now turned on as it passes from one roller to the other and across the point of pressure will heat the work to the welding temperature and soften the same slightly, after which the screw may be given a few more turns to effect a solid union. The work, hav

1029

ing been thus started, may now be moved along through or between the rollers, so as to bring successive parts of the joint into position to be pressed and heated at the same time. By this operation the metal will become thoroughly united as it passes through and out from between the rolls. It is obvious that the speed of the operation may be varied by varying the rate of heating and the rapidity at which the work may be fed through the rolls.

In Fig. 2 I have shown segments of rolls R R′ to be employed in special work, as in the joining face to face of two strips or plates M M′, which are of comparatively limited length in the direction of the joint. In this case the work is suppesed to be fed down vertically through the rollers and through the bed-plate. The length of the strips and of the joint between them is in this instance supposed to be of about the same length as the face of the segment, so that the pieces may be drawn or forced through and the whole length united by the time it has passed between the segments. The frames holding the segments or rolls are mounted as before described in connection with Fig. 1, and current may be supplied to them in the manner indicated, as by cables C C′, or in any other desired way. In all cases the work may be fed or passed between the rolls by means of power applied to the rolls or segments, in which case the friction of the rolls on the metal will draw the work through. If desired, power may be applied directly to the metal itself, the latter method being somewhat preferable.

In Fig. 3 an apparatus slightly modified from that of Fig. 1 is illustrated. Here the work is supposed to be fed down vertically through the bed-plate and between the rolls, and the movable frame of the roll R′ is a pivoted frame instead of a sliding frame, as in Fig. 1. The point of pivoting is indicated at P. The pressure-screw S is insulated from the frame F′ by engaging with a piece of insulating material, as indicated, let into the frame.

It is obvious that a large variety of work may be done by this process. Thus, as indicated in Fig. 4, the method may be applied to the formation of joints between pieces arranged to make V-shaped troughs or plates, the two parts being welded together at an angle, as represented, but the pressure being applied, as in the cases before mentioned, in such way as to press the surfaces to be welded into contact. The face of the roller may obviously be of any suitable form conforming to the ultimate shape of the finished article desired, and may then be used to shape or conform a flat strip or strips of metal into different shapes in cross-section simultaneously with the welding operation. In such instances, however, it would be necessary to employ a current of somewhat larger volume in order to heat the whole cross-section of the work that is exposed to the surface of the rollers in addition to the parts at or near the joint.

In Fig. 5 I have illustrated apparatus that may be used in welding a strip or rib M to the surface of a plate or strip M′ that is wider than said rib or is of a different shape therefrom. The roller rest or abutment R′ is made with an insulating face or surface immediately beneath the work or in the line with the smaller piece M, as indicated, but is of conducting material, to one side of such line. The effect of this is to cause the current to take the paths indicated by the arrow, so as to take a path through the surfaces of the strip or plate M′ near the edges of the work or joint, thereby causing proper heating and joining of the strip or rib M at its edges as well as at the inner or flat surface thereof.

What I claim as my invention is—

1. The herein-described method of forming an elongated joint by the electric welding process, consisting in feeding the work in the longitudinal direction of the joint through suitable pressure devices while properly arranged, so that the pressure devices will press the surfaces to be welded against one another, and simultaneously passing an electric current through the work at the point of pressure.

2. The herein-described improvement in forming electrically-welded joints, consisting in lapping the pieces to be welded upon one another, passing the lapped pieces through or between suitable pressure devices, forming the electrodes of an electric heating-circuit, and applying pressure to effect the weld.

3. The herein-described improvement in forming longitudinal seams or joints between strips or pieces of metal, consisting in feeding the strips or pieces through suitable rolls while arranged in proper position to be pressed together by such rolls, and at the same time passing a heating electric current from one roll to another and through the surfaces to be welded, as and for the purpose described.

4. The herein-described improvement in electric welding and shaping of metals, consisting in feeding two or more strips of metal to be welded together through forming or shaping rolls in the longitudinal direction of the joint, pressing the surfaces to be welded together by such rolls, and at the same time passing a current from roll to roll of sufficient volume to heat the strips to plasticity, so as to effect the weld and at the same time shape the metal to the desired form in cross-section.

5. In an electric welding apparatus, an abutment or rest for the work, made of insulating material at its surface immediately beneath the parts to be welded and of conducting material to one side of it, so as to cause a cur-

1050

rent to pass or be delivered through surfaces near the edge of the work, as and for the purpose described.

6. In an electric welding apparatus, a pressure and conducting roll a part of the surface of which is a conductor, while another part is a non-conductor, for the purpose of directing the current through the work under pressure.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 11th day of June, A. D. 1890.

ELIHU THOMSON.

Witnesses:
JOHN W. GIBBONEY,
DUGALD MCKILLOP.

Defendant's Exhibit No. 8 1051

(No Model.)

G. W. BLANCHARD.

ELECTRIC HEATING TOOL.

No. 466,266. Patented Dec. 29, 1891.

Fig. 1.

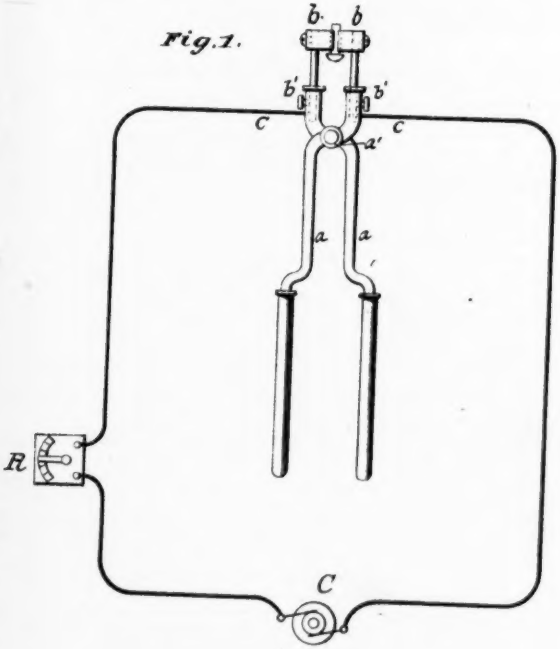
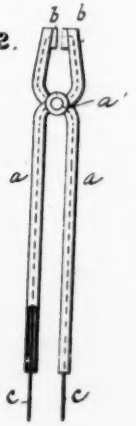


Fig. 2.



WITNESSES:

Edward A. Wagner

W. A. Roumbauer

INVENTOR

George W. Blanchard

BY

ATTORNEY.

1052

UNITED STATES PATENT OFFICE.

GEORGE W. BLANCHARD, OF WATERVILLE, MAINE, ASSIGNOR TO THE ELECTRICAL FORGING COMPANY, OF MAINE.

ELECTRIC HEATING-TOOL.

SPECIFICATION forming part of Letters Patent No. 466,266, dated December 29, 1891.

Application filed April 3, 1891. Serial No. 387,490. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. BLANCHARD, a citizen of the United States, residing in Waterville, in the county of Kennebec and State of Maine, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

This invention has reference to devices for heating articles such as rivets by means of electricity. The primary object of the invention is to produce a device which may be used for heating rivets at locations where it would be inconvenient or impossible to have a forge, and also to provide a new method of handling rivets, whereby the process of riveting is rendered much quicker and the work more effectually accomplished.

The invention consists, first, in the method of heating rivets while the same are in transit from any location to their final place of deposit; and, second, the invention consists of a device similar to tongs, having means for grasping and subjecting a rivet to a heating-current of electricity.

In the accompanying drawings, Figure 1 represents a device constituting that portion of my invention capable of illustration, and Fig. 2 is a modification thereof.

a a represent the two arms or levers of a pair of tongs, pivoted together at *a'*. These tongs are preferably entirely constructed of strong insulating material, such as fiber. The handles are preferably hollow, as shown in Fig. 2, and the jaws have fitted to their extreme ends blocks or electrodes *b b*, of copper or other good conducting material, the adjacent faces of which are formed with a seat adapted to grasp and hold the body upon which the device is to operate. Binding-posts *b' b'* are provided on or near the electrodes to secure the ends of the electrical conductors *c c*, extending therefrom through the hollow handles of the tongs, as shown in Fig. 2, or directly from the posts *b' b'* to a source of electricity C. The circuit may also include the usual resistance box and switch R for the purpose of varying the current. As hereinbefore mentioned, the device is particularly adapted for heating rivets. The jaws or electrodes *b b* are therefore formed on their adjacent faces with grooves.

In operation the handles of the tongs are grasped by the operator, the jaws opened, and the rivet inserted and clamped between them in the ordinary way of operating tongs. The current is then turned on, and owing to the fact that the rivet is of high-resistance material it soon becomes heated and is ready to become inserted into the hole which is to receive it.

In the ordinary process of riveting heavy work the rivets are usually heated in a forge and carried in ordinary tongs from the forge to the place of deposit or the hole which is to receive it. It is then inserted and headed up. In passing the rivet from the forge to the place of deposit it cools considerably, and therefore requires that it be heated in the first instance too hot, or else it is too cold when it reaches the riveter.

My improved method of riveting consists in heating the rivet while it is being conveyed to its place of deposit. This is done by grasping the rivets in the tongs hereinbefore described, turning on the current, and conveying the tongs with the rivet to the hole which is to receive it and inserting the same into the hole. By this method the heating operation and the transportation of the rivet are simultaneous and the result is that the rivet is delivered to the hole at just the right heat without any loss of time.

It will be observed, of course, that the conductors connected with the tongs are flexible and may be of any desired length. It will, therefore, be convenient to carry the tongs from place to place to carry out the method.

I claim as my invention—

1. An electric heating device consisting of tongs, in combination with two electrodes, one secured to each jaw of the tongs and electric conductors secured to said electrodes.

2. An electric heating device consisting of tongs, having insulated handles and means for connecting electric conductors to its jaws.

3. An electric heating device consisting of tongs having hollow insulated handles, electrodes connected with the jaws of the tongs, and electrical conductors extending through the hollow handles and connected with said electrodes, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEO. W. BLANCHARD.

Witnesses:
FRANK L. PLUMMER,
G. H. BOOTHBY.

Defendant's Exhibit No. 9 1053

(No Model.) 2 Sheets—Sheet 1.

E. THOMSON.

ELECTRIC SOLDERING.

No. 496,019. Patented Apr. 25, 1893.

Fig. 1.

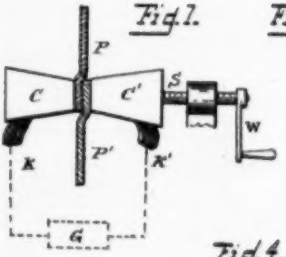


Fig. 2.

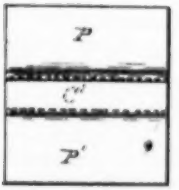


Fig. 3.

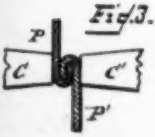


Fig. 4.



Fig. 5.



Fig. 6.

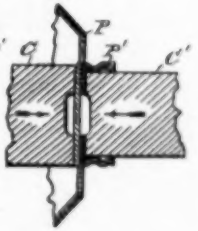


Fig. 7.

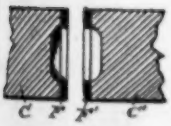


Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.

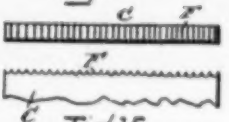


Fig. 16.

Fig. 15.

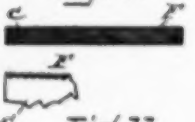


Fig. 17.

Witnesses
[illegible]

Inventor
Elihu Thomson

By his Attorney
H. L. Townsend

1054

(No Model.) 2 Sheets—Sheet

E. THOMSON.

ELECTRIC SOLDERING.

No. 496,019. Patented Apr. 25, 1893

Fig. 18.

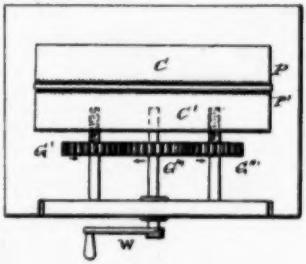


Fig. 19.

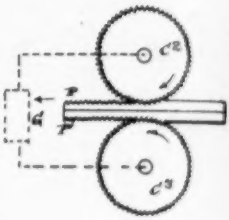


Fig. 21.

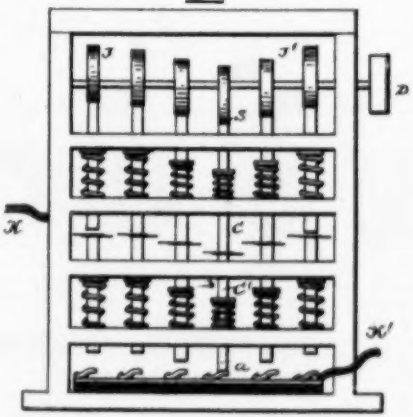
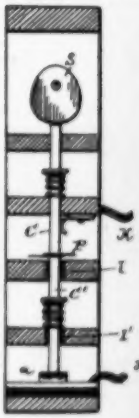


Fig. 22.



Witnesses
Chas. P. Steward.
Wm. H. Capel

Inventor
Elihu Thomson

By his Attorney
H. L. Townsend

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON ELECTRIC WELDING COMPANY, OF MAINE.

ELECTRIC SOLDERING.

SPECIFICATION forming part of Letters Patent No. 406,019, dated April 25, 1893.

Application filed January 23, 1888. Serial No. 297,161. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Electric Soldering, of which the following is a specification.

My present invention relates to an improved method of producing soldered joints between metal pieces, and is particularly applicable to soldering sheet metal pieces flatwise. When applied to tin plate the tin itself which covers the iron plate is often sufficient for the uniting solder. In other cases solder may be applied.

My invention consists in clamping or pressing the pieces together at the seam or joint, passing an electric current through either or both of the pieces to be joined, and in sufficient volume to melt the solder or uniting metal, cutting off the heating electric current, and maintaining the pressure until the joint is sufficiently cool.

Great difficulties have hitherto been experienced in soldering long seams owing to the fact that the cooling takes place unequally and, at the moment the solder sets, parts of the seam contract and draw so as to break the joint. The pressure which holds the pieces together must be continued and the piece held rigidly during the cooling or setting of the solder. This is easily accomplished in my invention since the cutting off of the current allows the pieces to cool, while the pieces still remain clamped and hold firmly during the setting of the fused metal.

My present invention, like my prior inventions in electric soldering, brazing and welding, involves the use of electric currents of low potential but large volume derived from any suitable source, together with suitable devices whereby the current may be cut off or regulated.

My invention comprises further an improvement in electric soldering consisting essentially in establishing an electric resistance to the passage of the current from the clamp or pressure block back of the joint to the metal or the work to be joined. This may be done either by modifying the surface of the pressure block itself or by modifying the surface on which it bears, or both, or by the interposition of a thin septum, layer or zone of resisting material, or material modified in condition or form so as to oppose a resistance to the passage of an electric current. Some of these means for establishing a resistance are hereinafter more particularly described.

In the accompanying drawings:—Figure 1, shows apparatus that may be used in practicing my invention. Fig. 2, is a view of the work. Figs. 3, 4, 5 and 6, show other forms of joint and of work. Figs. 7, 8, 9, 10, 11, 12 and 13, are sectional, side and face views of clamps having particular kinds of contact faces. Figs. 14, 15, 16 and 17, are face and side views of elongated clamps for use in connection with long joints. Fig. 18, is a plan of mechanism for operating an elongated clamp. Fig. 19, is an end elevation of pressure rollers applied to the work of soldering in accordance with my invention. Fig. 20, is an edge view of a roller. Fig. 21, is an elevation of a gang of clamps and mechanism for operating the same successively and establishing electrical connection with them in accordance with my invention. Fig. 22, is a side elevation of a pair of clamps the frame in which they are mounted being shown in cross section.

In Fig. 1, P, P′, are sheet metal pieces such as tin plate which are overlapped for a joint and pressed together at the overlapped portion by pressure pieces C, C′, one or both of which are movable, as C′, under the influence of a screw S, which, turned by a suitable crank or other device, gives pressure to hold the pieces P, P′, firmly and squarely. The pieces C, C′, may be suitably guided so as to move in a right line toward and from the other, the surfaces bearing on the overlap of the plates P, P′, being made true and square so as to bear evenly thereon. Heavy electric currents are conveyed to the clamp pieces C, C′, by conductors K, K′, or in any suitable way from a source indicated by G. In the case of the pieces P, P′, of tin plate, a union takes place at the overlap when a sufficient strength of current to melt the tin between the surfaces has been passed. The current being then cut off the pieces are allowed to cool in position under pressure until thoroughly joined after

which the pressure is taken off and the plate removed. In other cases suction is applied to the joint when hot. The union is facilitated by a flux, if needed. Slightly oiling the melting surfaces with lard oil or other exercise containing oil will usually suffice when the plates P, P', are to glass.

Fig. 3, shows the plate P, P', fastened and in dotted lines, the portion of the contact clamp-plate C'. The clamping movement to secure by regulating or controlling the current may be such as are described in my prior patents, as, for instance, as in 507,503, or the clamping or pressure devices may be suitably modified, as to the shape of their clamping devices, when found desirable. It is not necessary in every case to pass the current across the joint from one plate to the other. The current might be passed in the general direction of the line or plane of the joint.

Fig. 4, shows that the joint to be made may be a double lap instead of the angle lap as in Figs. 1 and 3. The same application of non-adjustable pressure, passage of adjusting current and cooling under pressure with thumb-nut taken off, may be carried out with such a joint.

Figs. 5, 6 and 7, illustrate the union of two tin plate pieces of a different form. P, is a round plate curved up into form. P', is a ring plate with one edge turned in as indicated. The two are put together as in Fig. 5, the pressure blocks C, C', applied to form the meeting surfaces into close and true contact, and current is put on until the tin on the meeting surfaces melts out entire thus as in Fig. 5. The blocks C, C', may be of iron or other metal, as may those of Figs. 1, 2 and 3, but to concentrate the heat to the pieces P, P', I prefer to make them of steel in iron, or copper, and face them with a facing such as lard oxide, or have their surfaces which are to be applied to the work so will be insulated further on.

The facing of lard oxide, E, E', Fig. 7, of the blocks C, C', Fig. 5, is for the purpose of producing an electrical resistance to the work, or where the current enters the work, which tends to the accumulation of heat (occur with low current strength). The join between the metal pieces P, P' and the blocks C, C' should be good and made by interposing the metal and securing the pieces together by clamping for example. Due to account of the difficulty of this, and of the fact that the section is fragile, I prefer another arrangement as indicated in Figs. 8, 9, 10, 11, 12 and 13. This is simply the covering of the faces of the contact and pressure blocks C, C', with soldering-proof insulating covers E, E', which may be of paper, cardboard, mica or a series of pieces of glass cemented together, as in a surface block will fit the work. The arrangement as shown in Fig. 8, a double lap-joint of previous may be made resting on an angle or rabbeted bearing the surface sufficiently covered with metal points, or projections. In Fig. 11, a portion of the covering is shown as the surface projecting a closely placed series of edges of narrow width. In Fig. 12, the edges are rolled and formed as the corrugations of the grooving being rolled. In the form shown in Figs. 13 and 14, which are suitable only a few mm and a little over of such a thick as C, Fig. 14, a multitude of fine projections to project slightly from the face of the C, or E, and are ground down to a level of numerous projecting points to the plate. In all these cases the continuation of the current from the plates held between the blocks is greatly checked by the fine points of the faces as described, and the resistance to the passage of current at the work is increased which in turn results in further softening of the metal plates where pressed up together between the contacting blocks C, C'.

Figs. 15 and 16, show the grooving of the pieces as E, which are long and narrow and are used to engage a piece of work such as in Figs. 1 and 3. Fig. 16, shows the case with the two grooved ends of pieces having a series of points projecting from the surface.

Fig. 17, shows the block C, of Fig. 15, in edge view.

Fig. 18, shows one of the many forms that may be used for uniting sections of pipe, as of the blocks C, C', upon the ends P, P', which are to be united together to convey something in large amount from one vessel to the other through the work. A, holds P, P', in the left hand and holds P, P', in the right hand and holds P, P', in the left hand and holds P, P', in the right hand and holds P, P', in the left hand and holds P, P', in the right hand and

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1058 Defendant's Exhibit No. 10

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H. LEMP.

METHOD OF PRODUCING LOCALLY ANNEALED STEEL PLATES.

No. 531,197. Patented Dec. 18, 1894.

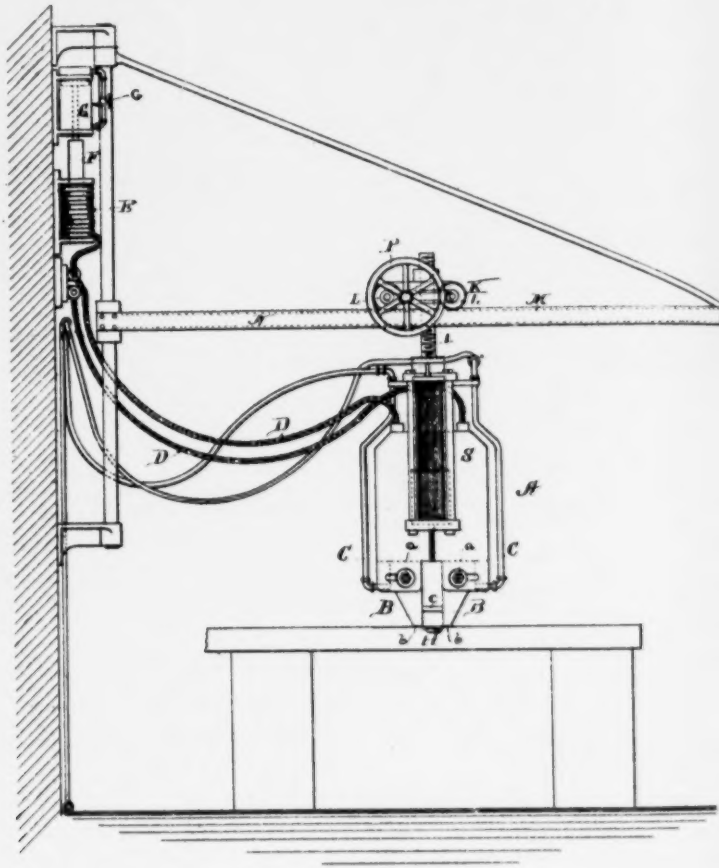


Fig. 1.

ATTEST:
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W. A. Kapfel

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Hermann Lemp
By [illegible]
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(No Model.) 3 Sheets—Sheet 2.

H. LEMP.

METHOD OF PRODUCING LOCALLY ANNEALED STEEL PLATES.

No. 531,197. Patented Dec. 18, 1894.

Fig. 2.

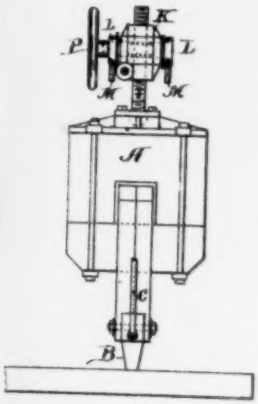


Fig. 4.

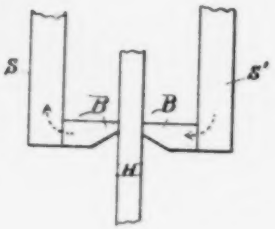


Fig. 3.



ITEST:
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C. A. Engel.

INVENTOR:
Hermann Lemp
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Attorney.

1060

(No Model.) 3 Sheets—Sheet 3.

H. LEMP.

METHOD OF PRODUCING LOCALLY ANNEALED STEEL PLATES.

No. 531,197. Patented Dec. 18, 1894.

Fig. 5.

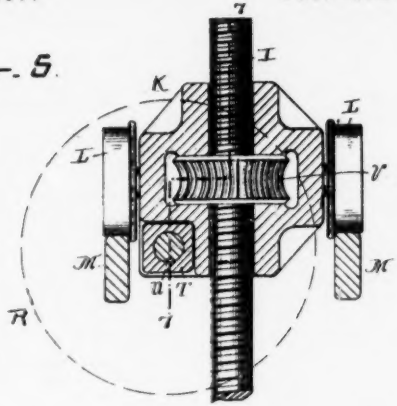


Fig. 6.

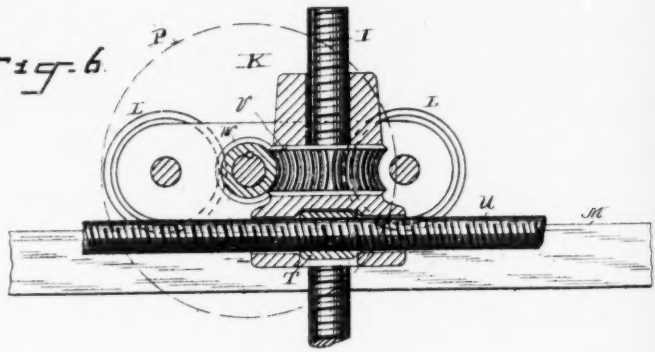
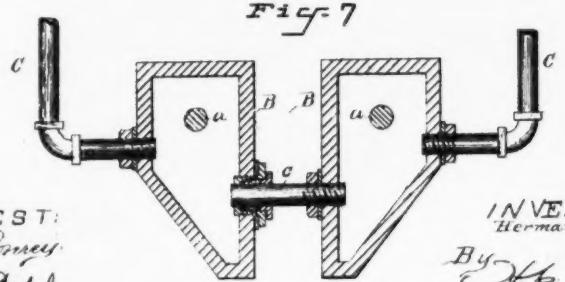


Fig. 7.



ATTEST:
J. H. Conley
Thos. A. Cabel

INVENTOR
Hermann Lemp
By Dyrenforth & Thomas
Attorneys.

UNITED STATES PATENT OFFICE.

HERMANN LEMP, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON ELECTRIC WELDING COMPANY, OF MAINE.

METHOD OF PRODUCING LOCALLY-ANNEALED STEEL PLATES.

SPECIFICATION forming part of Letters Patent No. 531,197, dated December 18, 1894.

Application filed August 1, 1894. Serial No. 519,214. (No specimens.)

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Method of Producing Locally-Annealed Steel Plates, of which the following is a specification.

My invention relates to a novel method of obtaining hardened plates or other pieces of metal, such as steel, locally softened to admit of cutting, tapping or drilling, and is especially useful in the production of Harveyized armor plates which require to be provided with bolt holes, countersinks, embrasures or other holes or openings when in place upon the ship, though it is also applicable to other plates or pieces of metal and whether hardened all through, or merely at and near the surface.

My invention consists essentially in hardening the whole piece of steel or other metal, then locally heating the spot or portion in the body thereof to be softened, to the proper temperature, by an electric current passed through the metal itself, and then allowing the said portion to cool while keeping it supplied with a gradually diminishing amount of heat from such current, the rate of diminution being adjusted, as hereinafter described, to the capacity of the surrounding mass of metal to carry the heat away, so as to cause it to cool gradually and at a sufficiently slow or proper rate to become soft at such heated portion. By producing the local heating through generation of heat in the desired portion of metal itself by the passage of an electric current through such portion, the heating may be much more closely confined or localized and the rate of cooling better controlled.

My invention consists further in certain appliances designed to aid in the purpose of locally heating by the electric current and of confining the heating to the desired spot.

It is well known that an ordinary piece of steel such as tool steel, manganese steel, &c., which, through its peculiar chemical composition has been tempered or hardened by plunging it in water after heating or by otherwise cooling it off rapidly, may be softened again by bringing it to the right temperature and leaving it in the open air to cool off gradually. It may of course be made softer yet by decreasing the rate of cooling by surrounding the metal with some refractory or heat insulating substance such as ashes, magnesia, &c.; but for all practical purposes an ordinary piece of steel may be annealed or softened by allowing it to cool in the air. If, however, the attempt be made to soften or draw the temper at an individual spot in a large plate or piece of hardened metal by heating it to the right temperature and then removing the heating influence suddenly, the surrounding metal will carry the heat away so fast as to chill the heated portion and harden the same as if the heated spot alone had been plunged into water or other cooling medium. Moreover, no covering with any heat insulating material would prevent this inasmuch as a large percentage of the hot metal is in direct contact with cold metal from which it cannot be isolated by any known means. For this reason in the production of Harveyized plates for armor plates, for instance, it has not been found practical to first subject the whole plate to the hardening process and then locally heat the part which is to be cut, tapped or drilled; nor has it been found practical to first cut, tap or drill the metal plate and subsequently harden it, for in the hardening operation the plate is liable to become deformed or to crack around the openings or holes. It has, therefore, been found necessary either to tap, cut or drill the hardened metal at great difficulty and expense or else to locally apply some material to parts of the plate which will prevent it from becoming hardened during the hardening process.

My invention obviates the difficulties and objections heretofore met with in dealing with hardened armor plate having a skin or coating of hardened metal as well as in dealing with other large masses or pieces of hardened metal which require to be cut or formed at some part, and consists essentially in first producing a complete plate or piece of the hardened material including the portion to be cut

1062

or formed, then by the passage of an electric current through the metal, heating the portion to be formed or cut to the proper temperature for drawing the temper and then allowing it to cool at such portion while supplying it with a gradually diminishing amount of heat from such current to prevent the fall of temperature in the heated portion due to the presence of the large masses of metal in direct contact with it from being a too rapid one.

By my invention the hard steel plate may be softened in isolated spots so that it may be readily drilled and tapped at such isolated spots alone, or continuous lines or extended surfaces may be softened for the purpose of allowing the material to be cut along the softened line.

In carrying out my process by the use of electric currents a transformer having a secondary adapted to supply current of large volume, such as is employed in electric metal working operations, may be used and the terminals thereof brought into contact with the previously hardened plate or mass of metal on either side of the spot to be annealed or softened. The current is made to enter the plate at one contact and leave it at the other bringing the intermediate portion to a dull red heat. If the process were stopped at this point and the current withdrawn, the metal would chill and be as hard in the spot as anywhere else but, if instead of withdrawing the current suddenly it be gradually diminished in amount in any well known manner as for instance by proper regulating devices, the temperature of the heated portion may be made to fall as gradually as it would if that portion were separate from the whole piece and left to cool on its own account. The depth to which this local softening process can be carried depends largely upon the arrangement of the contacts or manner of introducing the electric current by which the heat is generated in the body of the metal by the passage of the current through it. If the plate or piece of metal be hard through its whole thickness and not merely on its skin surface, the current may be made to enter at one side and leave at the other passing entirely through the mass of metal. On the other hand if only the skin is to be treated the contacts may be placed side by side upon the same surface.

The diminution in the rate of flow of the current after the metal has been brought to the proper heat may be produced by any desired form of current regulator as, for instance, by means of a reactive coil in series with the heating apparatus or by a resistance in series with the field of the generator furnishing the alternating currents for the heating transformer. Preferably, an automatically operating regulator actuated by gravity or other power is employed. The action of such regulator is adjusted to the desired rate by clockwork or any other time adjusting means which shall produce the required rate of decrease of such heating current in the metal.

The amount of heat furnished by the current might be gradually diminished or removed by moving the electrodes along the surface of the metal at the parts where it is to be locally heated and this may be a desirable way of producing a softened line of material in the hardened mass the rate of movement being, of course, adjusted to the particular circumstances of each case and being made slower where the mass of surrounding cold metal is larger or heavier. I have found, however, that good results may be obtained by adjusting the action of a current regulating resistance applied to any proper portion of the electric apparatus which furnishes the heating current in such manner as by its action to cause a diminution in the flow of said current.

In order to prevent the current from spreading too much and heating the metal beyond the desired zone of softening care should be taken not to use too heavy or powerful an electric current. This is particularly the case where the attempt is made to pass the current through the metal from one side of the plate to the opposite side.

I have obtained good results in the case of Harveyized plates by means of two copper contacts resting side by side upon the plate about one inch apart and each copper contact being about one inch square, then passing the current through the metal until the temperature between the contacts show a just visible red, and then reducing the heating current very gradually through a period of about ten minutes in which period the metal is allowed to cool gradually past the critical stage or temperature at which the material proceeds to set or become hard if the change of temperature is at such point rapid or sudden.

In the accompanying drawings I have shown some of the electrical apparatus that may be employed in practicing my invention.

Figure 1, is a general side elevation of an apparatus in which a transformer is used for heating one side of a piece of metal at an isolated spot. Fig. 2, is an edge elevation of the transformer. Fig. 3, shows in end elevation the transformer electrodes or contacts. Fig. 4, illustrates the manner of applying the electric contacts when the current is to be passed through from one side to the opposite side of the plate. Fig. 5, shows on a larger scale a vertical transverse section through the carriage K, taken in the plane of the axis of roll. Fig. 6, is a vertical section taken longitudinally of the carriage in the planes indicated by the line 7, 7, of Fig. 5; and Fig. 7, is a vertical section through the electrodes B, B, taken in the plane of the axes of pipes C, C, and a.

Referring to Fig. 1, A, indicates the transformer which may be of any usual type suitable for generating heavy currents.

S, is the secondary and B, B, the contacts reduced toward their lower ends to produce the small contact surfaces *b*, *b*, and made, preferably, adjustable on the terminals of the secondary for the purpose of varying the extent, of heated metal between them. These contacts or electrodes are preferably hollow and a stream of cooling liquid is circulated through them by means of pipes C, C.

At *c*, is a pipe connecting the two hollow electrodes.

One way of mounting and constructing the electrodes B, B, is illustrated in Figs. 1, 2 and 7. Each electrode is seated in a slide formed between projections on the lower end of the secondary S, and has a bolt *a*, passing through it and through slots in said projections as shown. On the ends of these bolts are washers and nuts for clamping the electrodes at the desired distance apart. The pipe *c*, is preferably of insulating material and may be firmly attached at one end in the wall of one electrode while it slides through a gland in the wall of the other electrode, or it may be of metal and be insulated from the electrodes by suitable bushings of insulation. The water pipes C, may be rigidly secured in the electrodes and move bodily therewith or they may pass through glands in the walls of the electrodes as desired. I have shown them as rigidly attached to the electrodes and, on account of their considerable length, depend upon their resilience in the adjustment of the electrodes. By thus keeping the contacts artificially cool the heating in the mass of metal is better localized at the portions thereof between the electrodes themselves. In practice it will be found that when only slight contact pressure is used there is a tendency of the metal at the surface in contact with said electrodes to heat more than at the portion between them but by artificially cooling the electrodes the heating may be better confined as stated.

The flexible conductors which supply the primary of the transformer are indicated at D, D. In their circuit is shown a reactive coil E, of any suitable construction whose core F, is suspended from an adjustable dash-pot G, of any suitable character employed for the purpose of checking the descent of the core by gravity into the reactive coils. By this device a retarded rate of action of the regulator is obtained to produce the diminished rate of flow of the current. To suit different cases, an adjustment may be provided to regulate the rate of descent or movement of the movable portion of the regulator consisting, in this case, of the movable core F. When a dash-pot is employed the adjustment may be obtained by providing the dash-pot with a by-pass having a cock G', which will regulate the rapidity of the flow of air or liquid in the dash-pot from one side of its piston to the other. By adjusting this cock the flow of current may be caused to diminish at the desired rate varying as will be understood under different circumstances.

H, indicates a Harveyized plate under treatment for local softening and the portion involved in the heating current is indicated by the shaded portion between the electrodes. To aid in moving the transformer over the surface of the metal plate H, it may be hung from a rod I, by a ball and socket joint or other flexible suspension. The rod I, is in turn mounted on a carriage K, which has wheels L, running on the rails M, of a swinging crane or bracket N. Wheels P and R, operate on suitable mechanism mounted on the carriage and connected with the rod I, and the wheels L, to lower the transformer or to move it along the rails. Various forms of mechanism may be devised for manipulating the transformer and its carriage. For the purpose of illustration I have shown the carriage provided with a recess for the reception of a steel nut T, through which and suitable ways in the carriage passes the screw U, which is rotated by wheel R, in moving the carriage and the suspended transformer over the plate. As a means for raising and lowering the transformer, I have shown a worm nut as V, located in the frame of the carriage and turned about the suspending rod I, by means of the worm W, which is rotated by the hand wheel P. By these means and by the swinging crane the transformer may be adjusted over any desired spot on the plate or mass of metal H.

As will be seen in Figs. 3 and 4, the electrodes or contacts where they engage with the mass of metal are made rather small, this being for the purpose of localizing the heating current so far as possible and the undue heating at such points is prevented by the artificial cooling.

What I claim as my invention is—

1. The herein described method of obtaining a hardened piece of metal with a portion only in the body thereof softened, consisting in hardening the whole piece, generating heat in the portion to be softened by an electric current passing through the metal itself at the portion whose temper is to be drawn, and then gradually diminishing the amount of heat supplied by the current to said heated portion at such a rate that, at any period of time, the amount of heat supplied is nearly but not quite equal to the amount of heat being absorbed by the surrounding metal, as and for the purpose set forth.

2. The herein described process of locally softening or drawing the temper from a Harveyized plate or similar plate having a skin of hardened metal, consisting in passing a heating electric current through the metal from one point on the surface thereof to another point by electric contacts engaged with said surface, heating the metal by the heat generated through the passage of the current in the metal, and to a dull red heat, and then

1064

gradually removing or withdrawing the electric current, at such rate that the amount of heat supplied is nearly but not quite equal to the amount of heat being absorbed by the surrounding metal, as and for the purpose described.

3. In a heating device employing a transformer, the combination with the secondary, of hollow contacts or electrodes connected thereto, feeding and discharge pipes connected respectively to said electrodes, and a pipe of insulating material connecting said electrodes for the purpose set forth.

4. In a heating device employing a transformer, the combination with the secondary, of hollow electrodes seated in ways in the ends of the secondary and adjustably secured in place, feeding and discharge pipes connected respectively to said electrodes, and a connecting pipe between the electrodes properly insulated therefrom and having a sliding union with one of them.

5. In an apparatus for producing local annealing, the combination with the heating device, of a swinging bracket provided with a track, a carriage running on said track for carrying said heating device, a screw located in said bracket, a nut in the carriage fitted to said screw, a hand wheel for turning the screw to propel the carriage, and means for raising and lowering said device for the purpose set forth.

6. In an apparatus for producing local annealing, the combination with the heating device, of an overhead track, a carriage on said track, a screw-threaded rod connected to the heating device, a worm-nut located on said carriage to receive said rod, a worm for operating said nut to thereby raise and lower the heating device, and means for moving the carriage along its track for the purpose set forth.

7. The combination, substantially as described, with an electric heating apparatus, of an automatic current regulator for producing a diminished rate of flow of the heating current, and a retarding device connected with said current regulator whereby a slow diminution in the supply of heat may be produced.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 30th day of July, A. D. 1894.

HERMANN LEMP. [L. S.]

Witnesses:
W. A. M. TAGGART.
H. N. SWEET.

(No Model.) 2 Sheets—Sheet 1.

H. LEMP.

APPARATUS FOR ELECTRIC WELDING.

No. 553,923. Patented Feb. 4, 1896.

Fig. 1.

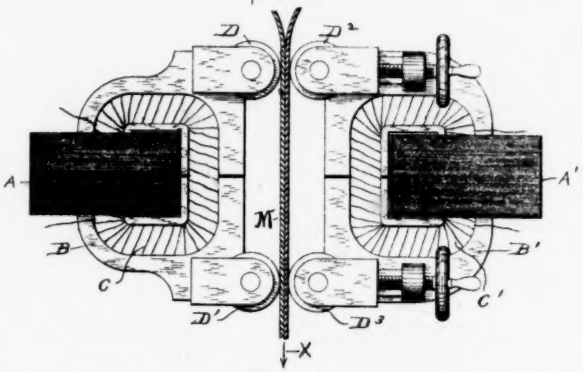


Fig. 2.

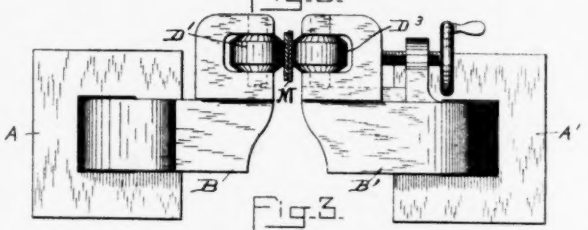
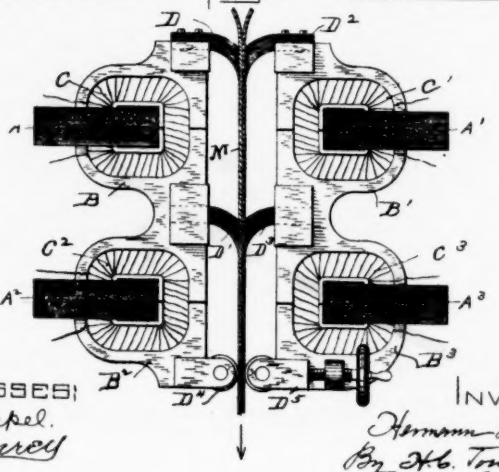


Fig. 3.



WITNESSES:
Louis Capel.
W. E. Conrey

INVENTOR:
Hermann Lemp
By H. G. Townsend
Atty.

1066

(No Model.) 2 Sheets—Sheet 2.

H. LEMP.

APPARATUS FOR ELECTRIC WELDING.

No. 553,923. Patented Feb. 4, 1896.

Fig. 4.

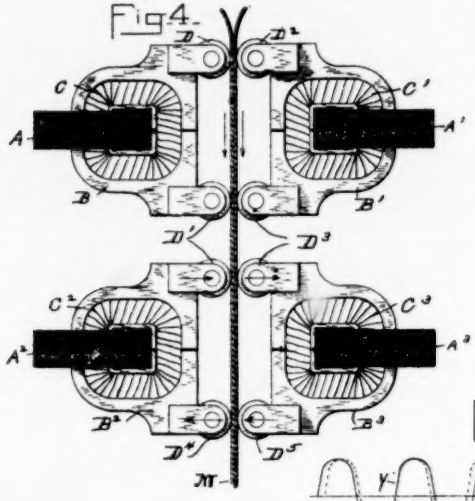


Fig. 7.

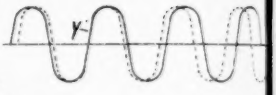


Fig. 6.

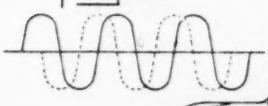
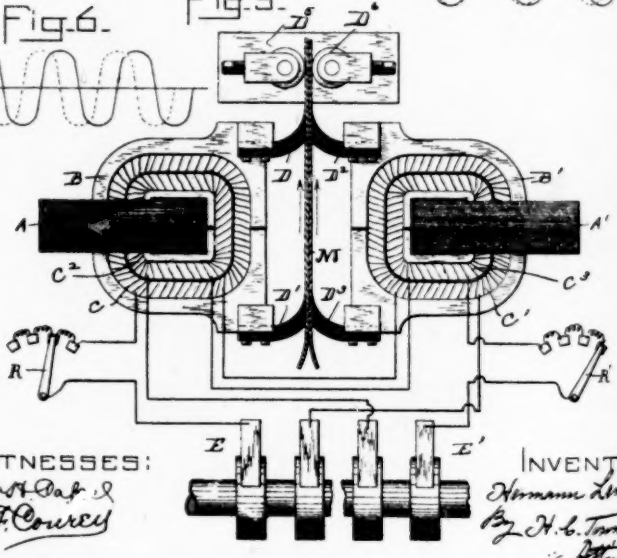


Fig. 5.



WITNESSES:
Wm. H. Dale Jr.
T. F. Coursey

INVENTOR
Hermann Lemp
By H. C. Turner
Atty

UNITED STATES PATENT OFFICE.

HERMANN LEMP, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON ELECTRIC WELDING COMPANY, OF MAINE.

APPARATUS FOR ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 553,923, dated February 4, 1896.

Application filed June 17, 1891. Serial No. 396,547. (No model.)

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Electric Welding, of which the following is a specification.

My invention relates to those electric metal-working operations in which one or more pieces of metal are heated by means of the electric current.

The object of my invention is to provide for a more thorough and uniform heating of the work in the operation; and the invention consists in applying to the metal heating electric currents of different frequency during the manipulation thereof, and the invention consists in the combination, arrangement and operation of parts as hereinafter fully described and set forth in the claim.

My invention is especially applicable to a metal-working operation consisting in the forming of long joints between strips, plates, bars or rods—such as boiler-plates or other articles which are at present riveted—by a welding, soldering, cementing or similar operation, though it is likewise applicable to the simple shaping, rolling or forming of a metal rod, bar or strip fed between the forming pressure devices.

I shall hereinafter describe my invention more particularly as applied to the formation of joints between long strips, bars or plates.

In carrying out my invention the heating-currents applied to the work may be two independent currents passed through the strips to be joined one in a direction parallel to the joint and one transversely or at right angles to the joint, or nearly so. Such transverse current might be one made to pass through or across the pieces diagonally, as the result of two independent alternating currents interfering or displaced in phase.

I include in my invention by the term "transversely" a current passed diagonally as well as at right angles through the metal piece. The two heating-currents may be passed through the same portion of the one or more strips, plates or rods at the same time or they may be entirely distinct and sent through one after the other. The heating-currents might be passed through a portion of the work longitudinally, which is some distance removed from the pressure devices and the current passed through such portion transversely only after it has reached the pressure devices.

In carrying out my invention I prefer to employ two distinct sources of energy supplying current to the work.

In the accompanying drawings, Figure 1 illustrates in plan an apparatus that might be used for the purpose of uniting plates, strips, or bars of metal and heating the same in the manner employed previous to my invention. Fig. 2 is an end view of the same. Fig. 3 illustrates an apparatus that may be employed in practicing my present invention. Figs. 4 and 5 illustrate other apparatus, also suitable for the purpose of my invention. Figs. 6 and 7 are graphic representations of currents as used in the method hereinafter explained.

Referring to Fig. 1, B and B′ indicate the secondaries of two transformers, each secondary being made in the manner commonly employed in electric metal-working apparatus, as a solid bar or mass of copper having a primary C or C′ applied in a groove in its side. A A′ are the laminated iron cores for said transformers.

D D′ D^2 D^3 are electrodes or contacts which are designed to pass heating-currents from the transformers into the work, here indicated at M as consisting of two strips of metal fed in the direction of the arrow between the electrodes or contacts. The electrodes or contacts D′ D^2 are in the form of rollers and constitute pressure devices that will serve to unite the metal or otherwise operate upon it as its heated portions pass between them. The two electrodes D D^3 may be similarly constructed as rollers and one of them provided with a screw for pressing it firmly against the work.

In using this apparatus, according to the old method, the heating-current was caused to pass through the section of metal included between the electrodes in the direction of the arrow from the point where the contacts D D^2 bear to the point where the pressure devices D′ D^2 bear, or to some point between

the pressure devices and the first-named contacts or rollers—that is to say, the current was passed in a longitudinal direction through the work before it reached the point where the pressure devices were applied. When the current is applied in this way, the work being drawn in the direction indicated by the arrows, the rollers D D^2 being forced toward each other slightly would effect the welding or otherwise act upon the heated metal. In this operation the work has been found to heat principally between the extremities of the secondaries or at the intermediate portion lying between the two sets of electrodes or contacts; but the parts of the work near the rollers would keep comparatively cool, because of the fact that the rollers being of large mass and good conducting material would have a considerable cooling effect. Hence it frequently happened that by the time the heated work reached the point of application of the pressure devices it would be cooled down so that the rollers could not act with the best effect.

It has also been proposed in some cases to pass the current transversely through the work—that is to say, from contact D to D^2, or reversely, and also from roller D′ to D^1, or reversely. This would be effected by properly combining the transformers as to polarity so that they should work in series with one another. In this method the work would heat at or near the contacts or electrodes; but the action was not satisfactory, because the part which would be heated between D and D^2 would cool while passing to the pressure devices and would have to be reheated at the latter point in order that it might be welded or formed. Such a process would obviously be a wasteful one.

My invention avoids the difficulties incident to the methods just explained and produces a uniform, effective and economical heating of the work.

In Fig. 3 I have illustrated apparatus which may be used for the purpose of carrying out my invention. I have shown the secondaries of transformers as the source of the heating-current, but do not limit myself to the employment of such instrumentalities.

In Fig. 3 I have shown practically two sets of transformers, one consisting of secondaries B B′, primaries C C′, and cores A A′, the other consisting of secondaries B^2 B^3, primaries C^2 C^3, and cores A^2 A^3. The two secondaries B B^2 on one side and B′ B^3 on the other are united in a single casting, but practically form each a separate secondary circuit. The contact-terminals of said secondaries are indicated at D D′ D^2 D^3 D^4 D^5. The terminal D′ serves as a common terminal for the two transformer secondaries B B^2, and the terminal D^3 serves as a common terminal for the transformer secondaries B′ B^3. Those terminals which are not employed for applying the pressure may be, as indicated, simple brushes, while those—to wit, D^4 D^5—which are used for applying the welding or forming pressure are rollers. By connecting the primaries A and A′ to the source of energy in a manner to cause both poles or contacts D D^2 in the respective secondaries to be of one sign and both poles or contacts D′ D^3 thereof to be of the opposite sign a current will flow in the work between the point of application of contacts D D^2 and the point of application of contacts D′ D^3, the secondaries then supplying the current in multiple, and that portion of the work extending from D D^2 to D′ D^3 serving to complete the circuit in the respective secondaries. By connecting the primaries C^2 C^3 to the source of energy in a manner to cause the poles or contacts D′ D^3 of the respective secondaries to be of unlike sign and the poles or contacts D^4 D^5 thereof to be of the reverse unlike signs respectively the current will pass transversely through the strips, bars or rods constituting the work at the points of application of the contacts D′, D^3, D^4 and D^5—that is to say, current will flow through the secondaries in series including the portions of work between D′ and D^3 and between D^4 and D^5. As the work is supposed to be continually moving along, any particular section will be first heated by the current passing longitudinally and then by the current passing transversely through it.

Fig. 4 illustrates practically the same arrangement, with the exception that the two sets of transformers are entirely separate as to their secondaries, and an extra pair of contacts is therefore required. The arrows indicate the directions of the current in the two systems.

Fig. 6 graphically shows the necessary conditions of the current that two secondaries may be in series and heat the work transversely, as in the second heating described in connection with Figs. 3 and 4. The full-lined curve may represent the waves of the alternating current in the secondary B^2, Fig. 4, and the dotted curve the waves of current in secondary B^3. It will be seen that when the current in B^2 is at a maximum and of positive sign, say, that in B^3 is at zero, but approaching its maximum negative sign, so that the two currents are in series, and the flow of currents as before mentioned. In order that the two currents may be in multiple, as in the longitudinal heating, the phases of current in each secondary must rise and fall simultaneously, or, in other words, coincide.

Fig. 5 illustrates apparatus wherein one secondary is made to provide the two heating effects. Each secondary is provided with two primary coils. B has the coils C and C^2, and B′ the coils C′ and C^3. C and C′ are connected in such manner that the secondary currents will be in multiple, and C^2 C^3 in such manner that the secondary currents will be in series. Each "set" of primaries is supplied from different sources of electric energy, one source being an alternating current having a greater frequency than the other. For instance, C C

is supplied with current from machine E and C^2 C^3 from machine E'. Suppose the current from E' has a frequency that is greater than that of E, then the currents may be graphically shown as in Fig. 7. The dotted curve is the current E' and the full curve that of E. It will be noticed that at certain points, as at Y, the two curves coincide, and the secondaries B B' will supply current to the work in multiple. At some other instant the curves will be just opposed to each other and the currents of B B' will be in series. At intermediate points a combination of effects will be produced, which may be readily studied out from Fig. 7.

The arrows in Fig. 5 denote the direction of movement of the work.

It will be obvious that, as in the case of Figs. 3 and 4, the pressure-rolls, Fig. 5, might be made the terminals of the heating source, so that the current passed transversely through the work would pass at the point of application of the pressure. It is also apparent that as the primaries furnishing longitudinal current are independent of those furnishing the transverse current, regulating devices may be used in each circuit to cause one or the other heating effect to predominate. In Fig. 3, R and R' are such regulating devices, so that if it is desired to weld stock of large section a heavier longitudinal current may be used without increasing the transverse current. Thus, for instance, the longitudinal current would be increased when the thickness of the piece to be welded was increased, but where the width was not. This would make a heavier path for the longitudinal current, but the section of stock through which the transverse current flowed would be no greater. The length of the path through the work for the transverse current might be slightly increased but would be almost nothing as compared with the increased section for the longitudinal current; or, if the increase of thickness were attended by an increase of width then the transverse current would be increased in the proper ratio. Again if the width of the stock was increased and the thickness correspondingly decreased in such ratio as to maintain the same area of cross-section transversely through the bar or bars to be heated the longitudinal current would remain the same while the transverse current would need to be larger, as the cross-sectional area of the path would now be larger.

What I claim as my invention is—

In an electric metal-working apparatus, the combination substantially as described with two transformers supplying heating-currents to the same work, of alternating-current sources connected respectively to the primaries of said transformers, and adapted to supply alternating currents of different frequency.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 12th day of June, A. D. 1891.

HERMANN LEMP.

Witnesses:
C. A. WILKINSON,
W. B. LEWIS.

Defendant's Exhibit No. 12

(No Model.) 2 Sheets—Sheet 1.

W. ROBINSON.

RAIL JOINT.

No. 574,942. Patented Jan. 12, 1897.

Fig. 1.



Fig. 2.

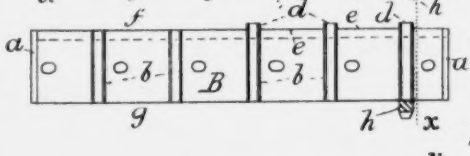


Fig. 4.

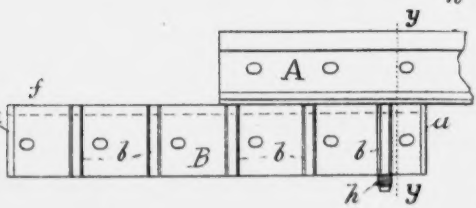


Fig. 6.

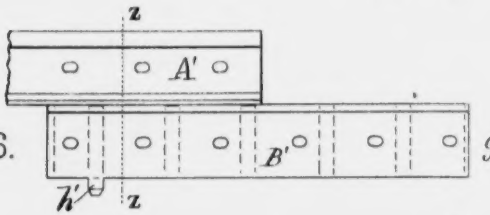


Fig. 8.

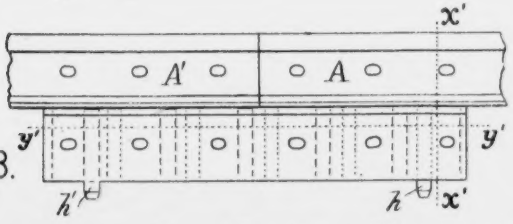
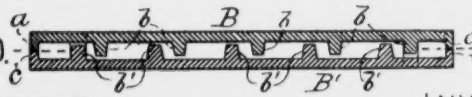


Fig. 10.



WITNESSES:

James H. Ripley

J. R. Hayward.

INVENTOR

Wm. Robinson.

COPY BOUND CL

(No Model.) 2 Sheets—Sheet 2.

W. ROBINSON.

RAIL JOINT.

No. 574,942. Patented Jan. 12, 1897.

Fig. 11.

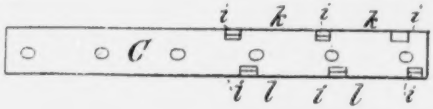


Fig. 12.



Fig. 13.

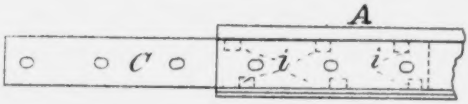


Fig. 14.

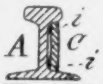


Fig. 15.

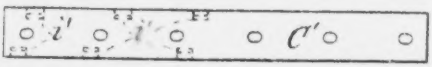


Fig. 16.



Fig. 17.

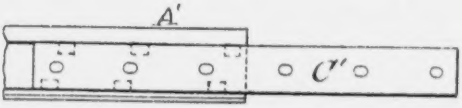


Fig. 18.



Fig. 19.

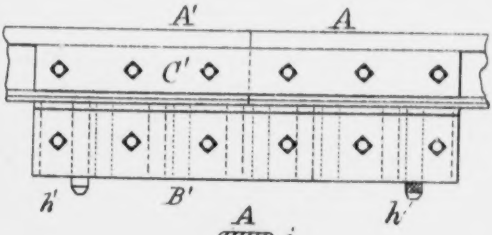
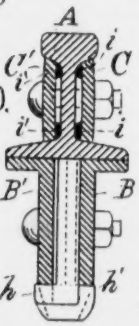


Fig. 20.



WITNESSES:

James H. Ripley.

J. R. Hayward.

INVENTOR.

Wm. Robinson.

OSE IN CENTER

1072

UNITED STATES PATENT OFFICE.

WILLIAM ROBINSON, OF BOSTON, MASSACHUSETTS.

RAIL-JOINT.

SPECIFICATION forming part of Letters Patent No. 574,942, dated January 12, 1897.

Application filed November 14, 1894. Serial No. 528,715. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ROBINSON, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Rail-Joints, of which the following is a specification.

This invention relates to improvements in the rail-joint shown and described in my application for a patent thereon filed October 7, 1893, Serial No. 487,530, and I do not therefore herein claim anything described and broadly claimed in the aforesaid application.

The nature of my invention will be understood from the description which follows, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is a top view of a girder-plate, illustrating a part of my invention. Fig. 2 is a side view of the same; and Fig. 3, a cross-section through the lines $x x$, Figs. 1 and 2. Fig. 4 shows the end of a rail with the girder-plate secured thereto; and Fig. 5 is a cross-section through the line $y y$, Fig. 4. Fig. 6 is a duplication of Fig. 4 on the opposite end of the rail, or preferably for my purpose, as shown, on the end of the rail adjacent and corresponding to that shown in Fig. 4. Fig. 7 is a cross-section through the line $z z$, Fig. 6. Fig. 8 shows Figs. 4 and 6 combined and the invention thus more fully developed. Fig. 9 is a cross-section through the line $x' x'$, Fig. 8. Fig. 10 is a horizontal section through $y' y'$, Fig. 8. Fig. 11 shows the side splice-bar, and Fig. 12 a cross-section of the same. Fig. 13 shows the side splice-bar secured to the end of a rail, and Fig. 14 is a cross-section of the same. Fig. 15 shows a similar side splice-bar for the adjacent rail, and Fig. 16 a cross-section of the same. Fig. 17 shows said splice-bar and rail secured together, and Fig. 18 a cross-section of the same. Fig. 19 shows the rail-joint complete in elevation, and Fig. 20 is a cross-section of the same.

A is a railroad-rail, to the bottom of which the girder-plate B is rigidly secured, preferably by the electric welding process. The girder B, as shown in the drawings, has one half of its length projecting under and welded to the bottom of the rail A, the other half projecting beyond the end of said rail and under the adjacent rail for the purpose of supporting the latter.

The form of the girder-plate B is peculiar. By referring to Fig. 10 and some other figures it will be seen that the vertical web of the plate B is provided with inwardly-projecting vertical ribs or lugs b, while the corresponding plate B' is similarly provided with inwardly-projecting ribs or lugs b'. The dotted line passing longitudinally midway between the plates B B' coincides with the center line of the rail, as shown also in dotted lines in Figs. 5, 7, and 20.

The reason for making the girder-plate B in the form described is this: When two pieces of metal are electrically welded together, the molten metal flows so as to make a rough and enlarged joint, and when one piece of metal is thus welded to another in such a way as to form an angle between the two the angle is partly filled up and rounded out by the molten metal. If, therefore, the plates B B' were formed with a continuous smooth edge on their inner surface and were welded with this edge coinciding with the longitudinal center line of the rails, the molten metal would partly fill up the angle formed between the plates and the rails at the longitudinal center line of the latter. As a consequence the aforesaid plates B B' could not come close together because of the intervening overflowed metal, that is, the adjacent rails would be out of alinement. In the present instance, however, the girder-plates B and B' are located to one side of the center line of the rails, leaving a considerable open space between the main body or vertical webs of said plates. At the same time the projecting ribs b b' extend under and even beyond the center line of said rails, whereby the adjacent rails are centrally supported by each of the plates B B'.

It will be observed that the ribs b b' alternate with each other, but do not come close together; also, that there is space left between said ribs, respectively, and the webs of their opposite girder-plates. Thus the overflow of molten metal taking place in welding the plate B to the rail A will not interfere with the proper location and alinement of the plate B' when the adjacent rails are brought together, nor, on the other hand, will the over-

flow metal caused by welding the plate B' to the rail A' interfere with the proper position and alinement of the plate B under similar circumstances, since there is sufficient space left between said plates B B' to allow for the overflow metal without the latter interfering with the proper position of adjacent parts. The plates B B' are provided, respectively, also with the ribs or projections *a* and *c*. When the adjacent rails are brought together, the ribs *a* abut against the ribs *c*, thus fixing the proper alinement of the rails. These ribs *a* and *c* are not affected by the welding, since they are removed sufficiently far from the location of the welding not to be affected by it.

The upper surface of the plate B is provided with slight upward projections or contact-points *d*. These points are brought in contact with the bottom of the rail in proper position preparatory to welding. When the welding-current is turned on, it is localized at the points *d*, and only these points and the corresponding points of the rail are brought to a welding heat. As a consequence the weld is much more quickly made and with much less current than if the continuous upper surface of the plate B were brought in contact with the rail. This arrangement therefore is in the interest of economy and practicability. Perhaps a much more important consideration, however, is this: When the contact-points *d* and the corresponding points of the bottom of the rail have reached a welding heat and the plate B and rail A are rigidly clamped together to produce the weld, the intervening parts *e* of the upper surface of the plate B and the parts of the rail corresponding thereto have not been raised to a welding heat. Consequently when these parts come together the welding compression can force them no farther and therefore the parts *e* and the normal bottom of the rail are retained in perfect alinement with the upper surface *f* of the outer end *g* of the plate B. Thus provision is made for keeping the lower and upper surfaces of the adjacent rails in perfect alinement.

It is to be observed that the contact projections *d* are placed only on the inner or welding end of the plate B, the outer end *g* of said plate being free from such projections.

The plate B is provided at or near its inner end and at the bottom with the inwardly-projecting lug or support *h*, and the plate B' is similarly provided with the supporting-lug *h'* at its inner end.

Now when the rails A and A', with their respective plates B and B', are brought together in forming a joint, as shown in Figs. 8 and 9, the lug *h'* of the plate B' supports the free or outer end of the plate B, and in like manner the lug *h* of the plate B supports the free or outer end of the plate B'. Thus each rail is supported close to the junction of the two rails by the girder-plate welded to the bottom of the adjacent rail, and each rail, in addition, is supported, through the girder-plate welded thereto, by the lug at the extreme inner end of the girder-plate welded to the adjacent rail, that is, each rail is supported far beyond its outer end by the lug on the inner end of the girder-plate welded to the adjacent rail. This forms an interlocked or trussed joint which in itself gives an enormous support to the ends of both rails.

The bolt-holes in the plates B B', or some of them, are oblong in shape to allow for the proper expansion and contraction of the rails, and in forming the joint these plates are preferably securely bolted together, as shown in Figs. 19 and 20.

To further enhance the efficiency of the joint, the fish-plate C is welded to the side of the rail A, one end of said fish-plate being welded in the side groove of said rail and the other end projecting beyond the end of the rail, as shown in Figs. 13 and 14.

The fish-plate C is provided on its inner side with the projections *i* near the upper and lower edges of said plate.

When the plate C is placed in the groove of the rail in position to be welded, these projections *i* find a bearing against the rail adjacent to the upper and lower corners of the groove of the same. The projections *i* are normally long enough to keep the main body of the plate C a short distance away from the rail. As soon, however, as the welding-current is turned on it quickly brings the projections *i* and the parts of the rail touched by them to a welding heat. The clamp is now applied to press the plate C and rail together to complete the weld, as shown in Figs. 13 and 14.

It will be seen that the upper and lower edges *k l* of the plate C intervening between the projections *i* are not brought to a welding heat, and consequently the pressure exerted in welding brings these edges up to a close-fitting position against the flange and head of the rail, as shown in Fig. 14, but does not interfere with the proper alinement of the edges of the plate C throughout any part of their entire length. As a consequence when the plate C is welded to one rail its outer or free end will fit exactly into the groove of the adjacent rail and the two rails will be in exact alinement.

It will be noted that if the whole surface of the upper and lower edges of the plate C in contact with the rail were brought to a welding heat the welding pressure on the plate C would be liable to press the welded end out of alinement with the free end, and consequently the adjacent rails when brought together would be out of alinement.

The construction shown in Figs. 15, 16, 17, and 18 is identical with that described in connection with Figs. 11, 12, 13, and 14, but applied to the adjacent rail. It is not necessary, therefore, to specifically describe these figures.

The completed joint is shown in Figs. 19

1074

and 29, in which the rail A, provided with the welded plates B and C, and the rail A', provided with the welded plates B' and C', are brought together. The outer or free ends of the plates B and C overlap the rail A' and the free ends of the plates B' C' overlap the rail A.

Bolts passing through the plates B B' and through the plates C C' and the rail hold the parts firmly together, forming a perfectly-trussed joint, the rails in perfect alinement in all directions and with proper provision for the expansion and contraction of the rails.

The rails are supported on ties or in any usual or suitable manner not necessary to illustrate.

If desired, the upper and lower projections *i* on the plate C might be joined together, forming a welding-rib across said plate, as shown in dotted line in Fig. 16, but I prefer the arrangement of small independent projections to facilitate rapidity of welding, economy of current, and in order to have several small welding-spots distributed over the rail rather than to have any single larger surface of the rail brought to a welding heat, since the latter would be liable to deteriorate the rail. For the same reason I prefer to put the upper and lower projections *i* diagonally opposite each other, as shown, rather than directly opposite each other. By thus "staggering" the welding-points I avoid such weakening of the rail as might occur by having more than one small welding-point in the same vertical plane of the rail.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rail-joint, a plate having one end permanently secured to the bottom of one rail, space being left being between said plate and the longitudinal center of said rail, the opposite end of said plate extending under and detachably supporting, the adjacent rail, substantially as described.

2. In a rail-joint, the combination, substantially as described, of two rails, each provided with a truss or plate having one end permanently secured to the bottom of said rail at one side of the longitudinal center of the same, and the opposite end extending under and supporting the adjacent rail, an open space being thus left between the inner vertical walls of said truss or bottom plates.

3. In a rail-joint, the combination, substantially as described, of the rail and a girder or truss plate having one end permanently secured to the bottom of said rail and the other end extending beyond the end of said rail and detachably supporting the adjacent rail, said plate being provided with ribs or projections extending inwardly toward or under the longitudinal center line of the rail and affording central support for the same.

4. In a rail-joint, the combination, substantially as described, of two rails, each provided with a truss or plate having one end permanently secured to the bottom of said rail at one side of the longitudinal center of the same, the other end of said plate extending beyond the end of said rail and forming a support for the adjacent rail, said plates being provided with vertical ribs or projections extending inwardly toward or under the center of the rail and arranged to afford central support for the same.

5. The girder-plates B B' adapted to be secured to the bottoms of adjacent rails, said plates being provided, respectively, with the inward projections *b b'*, said projections alternating with each other, substantially as described.

6. In a rail-joint, a splice-bar constructed for welded attachment to one only of the abutting rails, said bar being provided with a plurality of welding projections grouped nearer to one end of said bar than the other and adapted to form a plurality of welding connections with the same rail, substantially as described.

7. In a rail-joint, the truss or bottom plate B provided with the welding projections *i* with space between them, said projections being adapted to form several welding connections with the same rail, substantially as described.

8. In a rail-joint, a splice-bar constructed for welded attachment to one only of the abutting rails, said bar being provided with a plurality of welding projections grouped nearer to one end of said bar than the other, said projections forming a plurality of welding connections with the same rail, the position of said splice-bar between said projections, and not raised to a welding heat, limiting the compression and regulating the predetermined relative position of said splice-bar and rail when welded together, substantially as described.

9. In a rail-joint, a splice-bar provided with a plurality of welding-points projecting from the surface of said bar and grouped nearer to one end of said bar than the other, portions of said bar being located between said welding projections and not raised to a welding heat, limiting the position of said bar and causing the same to fit the surface or groove of the rail in a predetermined manner, whereby said splice-bar, when welded to the rail, will be in proper and exact alinement relatively to the rail or rails, substantially as described.

10. A splice-bar provided with welding-points projecting from its surface, said welding-points being located at intervals diagonally opposite to each other, substantially as described.

11. A rail-joint consisting, essentially, of the following elements in combination: two abutting rails, each provided with a truss plate having one end permanently secured to the bottom of said rail and the opposite end extending under and supporting the other rail, space being left between the inner vertical sides of said plates, said girder-

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interlocking and detachably supporting each other, fish-plates on opposite sides of said rails and bolts passing through said fish-plates and rails.

12. A rail-joint consisting, essentially, of the following elements in combination: two abutting rails, each provided with a truss-plate having one end permanently secured to the bottom of said rail and the opposite end extending under and supporting the other rail, space being left between the inner vertical sides of said plates, said girder-plates interlocking and supporting each other, and two fish-plates, each rail being provided with one having one end permanently secured to the side of said rail and the other end overlapping the abutting rail, said rails being detachably secured together.

WILLIAM ROBINSON.

Witnesses:
JAS. W. RIPLEY,
CHAUNCY C. ALLEN.

1076

Defendant's Exhibit No. 13

No. 616,436

Patented Dec. 20, 1898.

H. F. A. KLEINSCHMIDT.

ELECTRIC WELDING.

(Application filed Feb. 7, 1898.)

(No Model.)

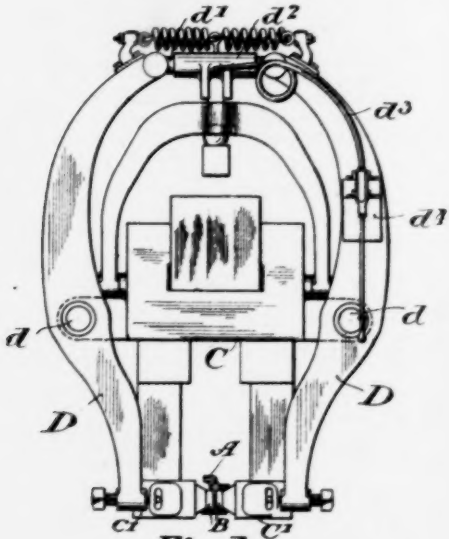


Fig. 1.

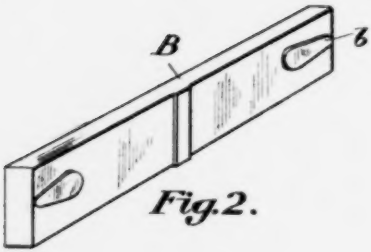


Fig. 2.

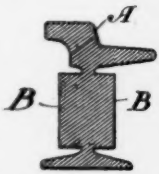


Fig. 3.

WITNESSES:

C. F. Kress, Jr.

H. C. Hall.

INVENTOR.

H. F. A. Kleinschmidt

BY

Richardson

ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY F. A. KLEINSCHMIDT, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE LORAIN STEEL COMPANY, OF OHIO.

ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 616,436, dated December 20, 1898.

Application filed February 7, 1898. Serial No. 669,352. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. A. KLEINSCHMIDT, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented new and useful Improvements in Electric Welding, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

This invention (Case A) relates to electric welding; and it is my object to provide a novel method for the same by which I am enabled to effect a highly-efficient weld without deteriorating the qualities of the steel and without subjecting the same to severe cooling strains.

The apparatus which I have shown and will describe by which my method can be put into effect is especially applicable for welding splice-bars to rails for the construction of what is known as "continuous railway-track:" but as my invention is also applicable for welding other products I do not desire to limit myself to the welding of continuous rails.

Ordinarily methods of welding tend to destroy the toughness of the metal, because the high heat renders the metal crystalline, and the subsequent upsetting causes the coarse crystals to separate and weaken their hold upon each other. In certain classes of welding, such as when a member is welded to the side of a rail, very severe strains are set up in the rail by the irregular heating and cooling and the sharp local contrasts in the temperature of the metal. This often causes the rail to break below its normal strength. In this same class of welding the burning of the metal under high heat often leaves cavities therein, which are not effectually closed by the ordinary process of upsetting. My invention is designed to obviate all of these troubles; and it consists in upsetting and simultaneously compressing the metal as soon as it is heated to the desired temperature and then retaining said metal under compression and in contact with cold metallic surfaces until the metal has become sufficiently cold to be deprived of nearly all of its plasticity.

Referring to the drawings, Figure 1 shows an apparatus for welding continuous rails in the street. Fig. 2 shows a splice-bar which is well fitted for use with my improved method. Fig. 3 shows a cross-section of a completed weld between two splice-bars and a rail, taken on a line which would pass through one of the bosses *b*.

A is the rail to which the splice-bars are to be welded.

B are the splice-bars.

C is a stationary electric transformer, having terminals C', adapted to engage the outside of the splice-bars.

D are arms which engage the back of the terminals C', are pivoted at *d*, and are connected at their upper ends to plungers d', moving in a cylinder d^2, which receives water through pipes d^3, connected with a hand-pump d^4.

In welding the bosses *b* to the rails the splice-bars are laid against the side of the rail and the terminals C' brought to the position shown in Fig. 1. Current is then passed transversely through the rail and the splice-bars until a suitable temperature has been reached, when the pump d^4 is operated and the terminals C' moved toward each other with a heavy pressure. The bosses *b* extend only a very short distance from the main body of the bar, so that they will not prevent the bar from making close engagement with the rail and so that any tendency which they may have to bulge out will be prevented by the rapid cooling and compression to which they are subjected. After upsetting such a weld, whether with light o. with heavy pressure, it has been usual to immediately relieve the pressure and remove the transformers from their contact with the bars. In accordance with the present invention, however, the pressure is retained at its maximum for a considerable time, and I have found that this is of the utmost importance. This time will vary under different conditions but should last until the temperature has fallen sufficiently to remove any considerable degree of plasticity. I find that it is usually safe to remove the pressure if the temperature has fallen sufficiently so that there is practically no glow given off by the cooling metal.

In the specific case shown the rail is about

1078

six inches high and is about eight square inches in cross-section. The pressure used is about twenty-five thousand pounds, and it is necessary for the best results to retain the metal under this compression for about two minutes after the heating-current has been shut off. I do not, however, desire to limit myself to these specific details, which I have only set forth as showing what I have found a preferred length of time for a particular form and size of weld.

I do not lay claim in this application to the form of splice-bar which I have shown and described, for this forms the subject-matter of an application for Letters Patent filed by me of even date herewith and serially numbered 669,353.

What I claim, and desire to protect by Letters Patent, is—

1. The method of electrically welding bars to the sides of rails which consists in passing the heating-current transversely through the bars and rail, forming the weld by laterally compressing the bars against the rail, and retaining the bars continuously under compression and in contact with relatively cold metal surfaces until said bars have cooled sufficiently to substantially remove their plasticity.

2. The method of electrically welding bars to the sides of rails which consists in passing the heating-current transversely through the bars and rail, forming the weld by laterally compressing the bars against the rail, and retaining said bars continuously under compression and in contact with cold conducting surfaces until they have cooled sufficiently to have lost substantially all appearance of glow.

In testimony whereof I have affixed my signature in presence of two witnesses.

HENRY F. A. KLEINSCHMIDT.

Witnesses:

RICHARD EYRE,

MYRTLE E. SHARPE.

Defendant's Exhibit No. 14

1079

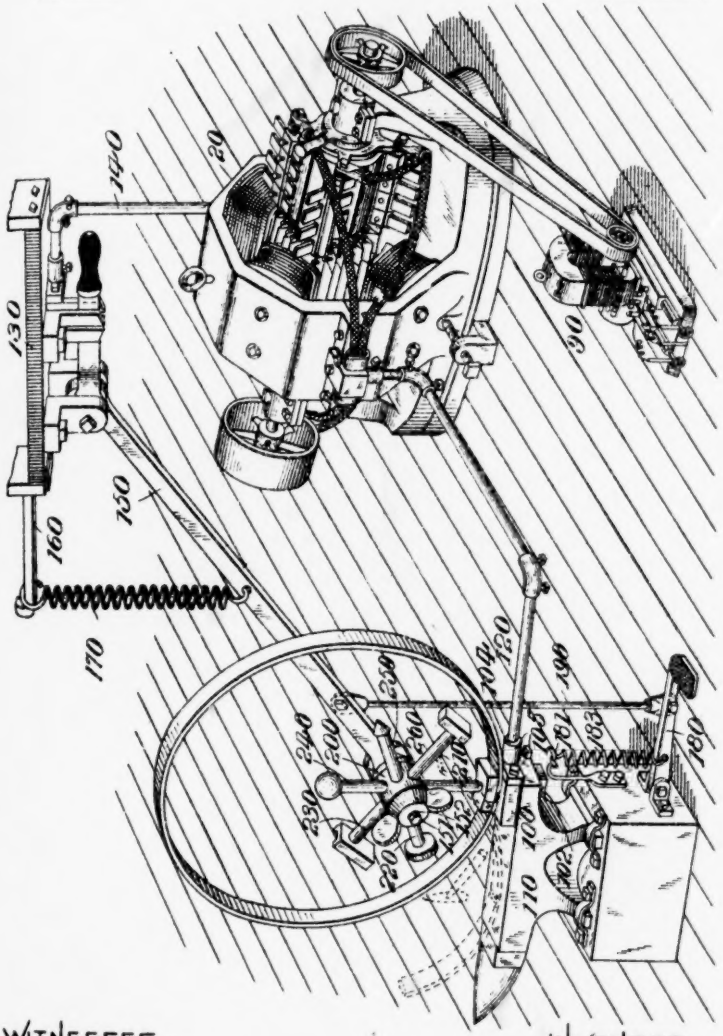
No. 647,694. Patented Apr. 17, 1900.

G. D. BURTON.

ELECTRIC METAL WORKING APPARATUS.

(Application filed Aug. 11, 1898.)

(No Model.) 2 Sheets—Sheet 1.



WITNESSES
S. M. Bonett
P. L. W. C. Lew

Fig. 1

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By F. C. Fonda
Attorney

No. 647,694. Patented Apr. 17, 1900.

G. D. BURTON.

ELECTRIC METAL WORKING APPARATUS.

(Application filed Aug. 11, 1898.)

(No Model.) 2 Sheets—Sheet 2.

WITNESSES

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Philip W. Crew

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Geo. D. Burton

By H. C. Somes,

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UNITED STATES PATENT OFFICE.

GEORGE D. BURTON, OF BOSTON, MASSACHUSETTS.

ELECTRIC METAL-WORKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 647,694, dated April 17, 1900.

Application filed August 11, 1898. Serial No. 688,382. (No model.)

To all whom it may concern:

Be it known that I, GEORGE D. BURTON, a citizen of the United States of America, residing at Boston, in the county of Suffolk, in the State of Massachusetts, have invented certain new and useful Improvements in Electric Metal-Working Apparatus, of which the following is a specification.

This invention relates to electric metal-working apparatus for the forging, welding, and brazing of metals and for heating metal articles, such as wheel-tires, for the purpose of setting them.

The invention is especially adapted for lap-welding by the use of a primary transverse current. The lap weld is superior to the butt-weld. No end pressure is required, and consequently there is no upsetting of the metal and no formation of a bulge or projection at the joint, which is afterward required to be filed or hammered down.

The object of the invention is to provide a simple, convenient, and compact apparatus for the use of a blacksmith or other metal-worker.

Figure 1 of the accompanying drawings represents a perspective view of this apparatus. Fig. 2 represents, on an enlarged scale, a front elevation of the rotary electrode-head, having a plurality of electrodes for a variety of purposes, and a vertical longitudinal section of a portion of an anvil supporting the opposite electrode, a piece of work to be lap-welded being disposed between the electrodes. Fig. 3 represents a longitudinal section of an anvil-electrode and a fragment of one of the wheel-electrodes adapted for countersinking screw-holes. Fig. 4 represents a transverse section thereof. Fig. 5 represents a vertical section of anvil and wheel electrodes, clamping between them a section of a grooved metallic portion of a vehicle-tire adapted for receiving a rubber tire. Fig. 6 represents a perspective view, preparatory to lap welding, of the lapping ends of the metallic portion of a vehicle-tire adapted to receive a rubber tire. Fig. 7 represents a vertical longitudinal section of wheel and anvil electrodes adapted for lap-welding the joint between two pipe-sections of different sizes. Fig. 8 represents a transverse section thereof. Fig. 9 represents a longitudinal vertical section of wheel and anvil electrodes adapted for brazing or welding a longitudinal slit in a metallic tube. Fig. 10 represents a transverse section thereof. Fig. 11 represents a longitudinal vertical section of anvil and wheel electrodes adapted to form a lap-weld between two bars of metal. Fig. 12 represents a transverse section through the lap-weld joint. Fig. 13 represents a vertical longitudinal section of one end of the anvil and of wheel and anvil electrodes adapted for riveting.

The same reference-numbers indicate corresponding parts in all the figures.

The electric current for use in this apparatus may be taken from any suitable source of electricity. I have devised for this purpose a dynamo-electric generator of peculiar construction which has a wide range of current as regards both amperage and voltage and which will supply a primary current of large volume and low voltage, thus avoiding the use of a transformer. The dynamo 20 herein illustrated is of this sort; but as it will constitute the subject-matter for a separate application for a patent it is not deemed necessary to herein describe it in detail.

An exciter-dynamo 90 is employed in connection with the generator-dynamo 20 for exciting the field of the latter, said exciter-dynamo being properly connected with the field-magnets of the generator by wires (not shown) and a rheostat being arranged in the field-circuit of the exciter for regulating the excitation of the field of the generator, as in United States Patent No. 475,232 to Burton, Eddy, and Briggs, dated May 17, 1892.

A bed-electrode 100, constituting one of the working terminals of the circuit, is supported on an anvil, as the blacksmith is accustomed to the use of the anvil and this arrangement suits his convenience, and the loss of heat incident to the transferring of the work from the ordinary forge to the anvil is avoided. The anvil herein shown consists of an ordinary anvil 110, which is provided at its rear end with a square vertical slot 111 and a round vertical slot 112. In this instance the round slot is shown as the one utilized for connecting the bed-electrode with the anvil. For this purpose the bed-electrode 100, as shown in Figs. 1 and 2, comprises a block of highly-conductive material, such as copper,

1082

provided with a downwardly-projecting stud 101, which extends through the hole in the anvil. The lower end of this stud is screw-threaded, and the nut 102 operates to clamp the electrode to the anvil. Any other suitable means may be employed for fastening the electrode to the anvil. The electrode is preferably insulated from the anvil by any suitable insulating material 103, such as fiber board or mica; but it is not absolutely necessary to provide this insulation, as the current used is low in voltage and the conductivity of the electrode is much higher than that of the anvil. This electrode is provided with a socket 104, having a binding-screw 105, and a conductor 120, which may consist of a bar of copper, connects said electrode with one pole of the generator-dynamo. A switch-block 130 is connected by conductor 140, also preferably composed of a bar of copper, to the other pole of the generator-dynamo.

An arm 150 is hinged to the switch-block 130 and carries at its free end a rotary electrode-head 200, having a plurality of radial arms, as 210, 220, 230, 240, 250, and 260, said arms carrying electrodes of different shapes adapted for different purposes. The electrode-head 200 is clamped to the hinged arm 150. The arm, as shown, is provided with a lateral stud 151, on which the hub of the electrode-head is adjusted, and a clamping-nut 152 on said stud holds said electrode-head in place. The electrode-head may therefore be readily removed, and another having electrodes of different shapes may be substituted therefor. An elastic support is provided for said arm, preferably in the form of a spring 170, having one end connected with a bar 160, extending from the switch-block, and connected at its other end with the hinged arm 150. This spring serves to normally support the hinged arm in such position that the electrodes of the electrode-head 200 will be above the electrode 100 on the anvil. The hinged arm is composed of conductive material, and the spring is insulated therefrom. A foot-lever 180 is hinged to the anvil or at any suitable point, and a connecting-rod 190 is connected at its upper end with the conductive hinged arm 150 and at its lower end with the foot-lever. This connecting-rod is insulated from the hinged arm. A spring 183, connected with a bracket 181 and with the foot-lever, tends to hold the foot-lever in elevated position. The spring 170 for supporting the hinged arm 150 is preferably so adjusted as to hold the arm in such position that the electrodes on the rotary head are held normally out of contact with the bed-electrode 100 on the anvil and to lift said electrode out of contact with the work when the foot lever is released.

The bed-electrodes 100 are made in a variety of shapes and are interchangeable to correspond with the electrodes of the electrode-head 200 for different kinds of work.

In the use of this apparatus the pieces to be lapwelded are adjusted or placed with their ends overlapping on the bed-electrode 100. Then the foot-lever is depressed, and one of the electrodes of the electrode-head is brought into contact with the work, whereby the circuit is closed and the current passes through the work in transverse direction across the overlapping ends of the parts to be heated. The current may pass in either direction from the generator and effect the result equally well. As soon as the piece is heated to the proper temperature, which may be ascertained by inspection thereof, the operator releases the foot-lever and the spring 170 lifts the hinged lever 150 and takes the upper electrode out of contact with the work, whereby the circuit is broken. Then the operator may shove the work forward on the anvil and hammer the joint or otherwise finish it, as desired. In this way the heating can be quickly and conveniently effected on the anvil without loss of time and heat and without forming an objectionable bulge in the work.

Any suitable block or bench capable of use in hammering, forging, or finishing metal may be considered as the anvil.

I claim as my invention—

1. In an electric metal-working apparatus, the combination of an anvil provided with a slot, a bed-electrode supported on said anvil and provided with a stud engaging said slot, said electrode being connected with one electric pole, and a swinging electrode supported above said bed-electrode and connected with the other electric pole.

2. In an electric metal-working apparatus, the combination of an anvil, a bed-electrode supported on said anvil and connected with one electric pole, a swinging arm carrying an electrode connected to the other electric pole, a rigid arm supported above said swinging arm, a spring connecting said rigid arm with said swinging arm and imparting an elastic support thereto, and a foot-lever connected with said swinging arm for swinging it into operative position.

GEO. D. BURTON.

Witnesses:
E. F. PHILIPSON,
GEO. STEINER.

Defendant's Exhibit No. 15

1083

No. 670,808. Patented Mar. 26, 1901.

J. C. PERRY.

METHOD OF ELECTRIC WELDING.

(Application filed Sept. 18, 1899.)

(No Model.)

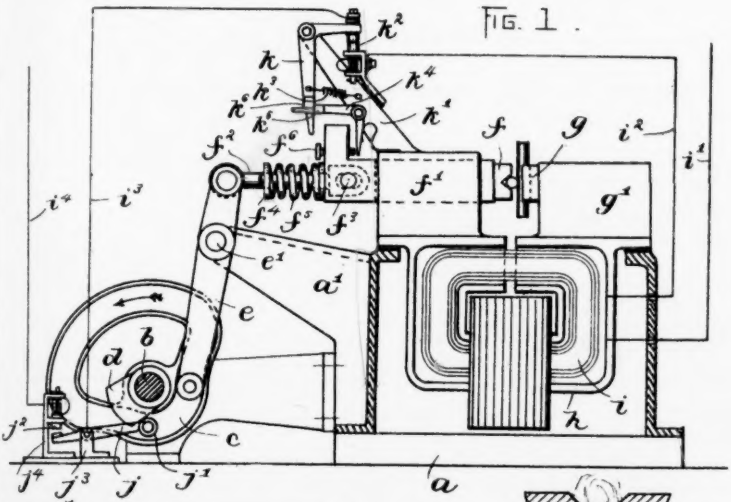


FIG. 1.

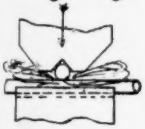


FIG. 4.

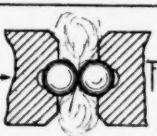


FIG. 6.

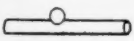


FIG. 5.

FIG. 7.

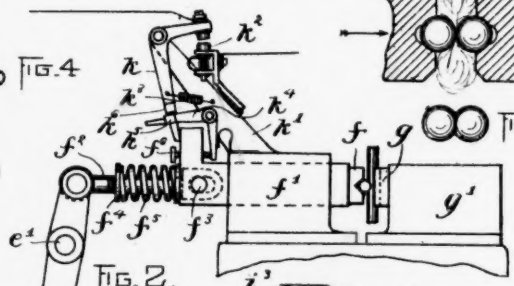
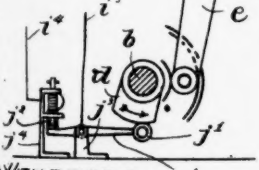


FIG. 2.



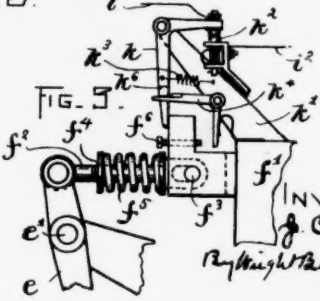


FIG. 3.

WITNESSES:
E. Batchelder.
P. W. Pezzetti.

INVENTOR:
J. C. Perry
By Wright Brown & Quinby
Attys

UNITED STATES PATENT OFFICE.

JOHN C. PERRY, OF CLINTON, MASSACHUSETTS.

METHOD OF ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 670,808, dated March 26, 1901.

Application filed September 16, 1899. Serial No. 730,554. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN C. PERRY, of Clinton, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Methods of Making Welds Electrically, of which the following is a specification.

This invention relates to a new and improved method for making welds electrically.

Reference is to be had to the accompanying sheet of drawings, forming a part of this specification, in which like characters of reference are used to indicate like parts wherever they occur.

Figure 1 represents in side elevation a section of a machine embodying my invention and shows a transformer, the pressure device, and the switches, and also the connecting-wires for completing the primary circuit. Fig. 2 represents in side elevation a detailed view of the machine, showing the position of the automatic switches after the completion of the weld. Fig. 3 is a substantially similar view showing the plunger in position to reset or lock in position the automatic circuit-breaker. Fig. 4 represents two parts when being welded together, with the envelop of vapor surrounding the joint exaggerated for the purposes of illustration. Fig. 5 shows the parts after the weld is completed. Fig. 6 represents two spherical bodies in the act of being welded. Fig. 7 shows the same when the weld is completed.

By my invention the welds are made instantaneously without any appreciable heating of the material adjacent to the point of the weld, and my improved method consists in the simultaneous application to the parts to be joined or welded of a mechanical pressure nearly equal to the crushing strength of the material and a current of electricity of relatively enormous volume. By using a mechanical pressure nearly equal to the crushing strength of the material I insure the parts being forced together the instant they soften, and by the employment of a current of electricity of relatively enormous volume compared with the area of contact of the parts to be welded I am enabled to produce an instantaneous heating or softening of the metal. The welding-current is much stronger than has heretofore been considered suitable, being from one to two hundred thousand amperes to a square inch, while the mechanical pressure of the electrodes for forcing the heated parts together is nearly equal to the crushing strength of the material being welded when cool. As a result of this the parts to be welded are first brought into intimate contact, and immediately thereafter the circuit is closed between the electrodes. The current is of such strength that the contacting parts of the said members become heated to a fusing-point immediately, and as soon as the metal sufficiently softens, so that its resistance is less than the force of the compression spring or weight, such spring or weight forces the movable electrode farther toward the stationary electrode to weld the parts together. Immediately after this compression the circuit is broken and before the heat is spread away from the contacting surfaces. Consequently the metal cannot be overheated or blown out. As the electrodes are relatively of large volume or area compared to the contacting metal to be welded, there is no necessity for artificial cooling. Further, by my invention two parts covered with a coating of metal fusible at a lower temperature than said parts can be readily welded—as, for instance, iron wire covered with a coating of zinc, as shown in Figs. 4 and 5. When the said parts to be welded are brought into contact, their contacting surfaces are of a relatively small area at the beginning of the operation and the area increases as the metals are compressed together.

It is obvious that since the coating of the parts to be joined is fusible at a temperature lower than the fusing-point of the body coated thereby said covering will be volatilized if the welding operation consume any considerable portion of time, and the covering at the weld will be removed and in case of iron the exposed part liable to rust. In accordance with my invention, however, the weld is practically instantaneous and the heat is localized at the point of contact between the two parts, so that only the coating at the point of contact is volatilized or disturbed, thus forming an envelop surrounding the weld, as portrayed in Figs. 4 and 6, to prevent access of air thereto and consequent oxidation, the rapidity of the weld being such that the heat

does not spread through the coating over such surfaces as are not brought into contact and welded together. The circuit is broken immediately upon the completion of the weld, so that the envelop of gas or vapor is chilled instantaneously and a portion of the said coating material is redeposited at the joint, oxidation being prevented by the outside portions of this vapor or gas. When heavy welds are made by this process, so that the fillet or bur of highly-heated metal is forced out of the joint, it is covered when of iron by a thin film of magnetite or magnetic oxid and is rust-proof.

As stated, in following out my process or method all of the contacting portions of the electrodes are made very large to permit the flow of the heavy current over the parts to be welded without injuring the covering of zinc or other material and also to assist in keeping the parts adjacent to the weld cool. By my invention the joints formed by the weld when the parts have the described coating are fully covered and protected by the zinc covering, for when two bodies covered with a coating fusible at a relatively low temperature are welded together by my method the covering is practically uninjured about the joint, and the joint is thus rust-proof. Further, by my invention two parts (of which one is under tension) can be readily welded, for, although the abutting or contacting portions thereof reach a high temperature for an instant, the heat is localized about said surfaces and does not extend through the entire body of the said parts, thus preventing the body from being stretched, elongated, or bent at the weld or dominated by the described stress or strain, as would be the case if the welding operation were continued, as was done prior to my invention, over such a period of time that the entire body of the metal became heated and softened, so that it would be affected by such stress or strain, for by my invention merely the contacting surfaces are softened.

While my invention may be carried out in many ways, I prefer for simplicity of construction the means shown in the drawings, which are herein illustrated in order to disclose the mechanism by which my improved method may be practiced.

a represents a part of the framework of the machine, said frame being formed in any desirable way and supported upon suitable legs or standards; but inasmuch as the construction of the framework forms no material part of my invention it is unnecessary to describe it in detail.

b indicates a shaft which is driven in any suitable way and on which is secured a path-cam *c* and also a cam *d*. The path-cam actuates a lever *e*, fulcrumed at *e'* on a bracket *a'*, forming a part of the framework, said lever being constructed and arranged to cause the actuation of a movable electrode *f*. Said electrode *f*, together with that indicated at *g*, is mounted in a suitable manner upon and insulated from the framework. The brackets *f' g'*, which support said electrodes, form a part of the secondary circuit (indicated at *h*) and the primary circuit, including the coils *i* and the wires i^2 i^3 i^4. The movable electrode *f* is connected to the upper end of the lever *e* by a connecting-rod f^2, which is slotted at its end to receive the pin f^3, passed crosswise through the plunger, of which the movable electrode forms a part, and between the end of the plunger and a collar f^4, adjustably secured upon the rod f^2, there is a powerful compression-spring f^5.

When two parts to be welded together according to my invention are placed between the electrodes and the cam *c* actuates the lever *e*, the electrodes clamp the said parts with a pressure a little less than the crushing strength of the metal of which the parts are formed, the spring f^5 being compressed when the resistance of the said parts becomes greater than the strength of the said spring, and after the contacting surfaces of the parts become softened the spring f^5 instantly and automatically forces the said parts into intimate contact to complete the weld, as shown in Figs. 5 and 7, and thus automatically breaks the circuit.

I so arrange the apparatus that the primary circuit is closed immediately after the clamping of the parts between the electrodes, and the circuit is broken when the movable electrode is pushed forward after the metal has become sufficiently softened to complete the weld or pushed to the limit of its forward movement, the whole operation taking place in a very short duration of time and the weld being practically instantaneous.

The circuit-closer is actuated automatically from the shaft *b* by the cam *d*, and it consists of the switch-lever *j*, having a roller *j'* bearing against said cam *d* and having its other end adapted to bear against the sufficiently-yielding contact j^2. The movable contact or switch-lever *j* is fulcrumed on a bracket j^3, suitably mounted on the framework, while the yielding stationary contact j^2 is supported in a bracket j^4. It is understood, of course, that the brackets in the lever *j* are suitably insulated from the rest of the machine, being included in the primary circuit.

The circuit-breaker is operated automatically by the movable electrode, as previously stated, and comprises the following elements: An elbow-lever k is fulcrumed upon a bracket k', supported by and insulated from the bracket f', and it constitutes a movable contact being connected with the wire i^3, and consequently with the switch-lever *j*. The stationary yielding contact k^2 is supported upon and insulated upon the bracket k' and is electrically connected with the wire i^2. A spring k^3 tends to break the circuit or to move the movable contacts from the stationary contacts k^2; but this tendency of the springs is overcome or prevented by a second elbow-lever k^4, fulcrumed upon the bracket k' and

having a knife-edge k^3, which engages a similar edge k^4 on the end of one of the arms of the elbow-lever k. The lever k^4 has an arm projecting downwardly into the path of an adjustable screw f^4 on the movable plunger or electrode f, and the parts are so adjusted at the final movement of the movable electrode upon the softening of the parts to be welded that the adjusting-screw f^4 engages the lever k^4 and disengages it from the movable switch-lever k, so that it permits the spring k^2 to break the circuit by swinging the movable contact away from the stationary contact k^3.

Manifestly the parts of the mechanism before described may be variously modified, and my improved method may be followed in making welds of various kinds without departing at all from the spirit or scope of my invention, which consists, as heretofore stated, in the simultaneous application to the parts to be joined of a mechanical pressure nearly equal to the crushing strength of the material and a current of electricity of relatively enormous volume.

This invention, as stated, I believe to be broadly new with me, and I desire to claim and to be understood as claiming the same in the broadest possible manner.

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim, and desire to secure by Letters Patent, is—

1. The method of making welds electrically, consisting of the simultaneous application to the parts to be joined of a mechanical pressure nearly equal to the crushing strength of the material to be welded, and of a current of electricity of relatively enormous volume, and subsequently and automatically breaking the circuit.

2. The method of welding coated wire which consists in localizing the heat at the point of contact to form about the joint a protective envelop of gas from the coating at the point of contact, and completing the weld while the joint is protected by said envelop and before the coating about the joint is destroyed.

3. The method of electrically welding parts having a coating of a relatively low melting temperature, which consists in applying to said parts a relatively enormous pressure, applying a current of electricity to said parts at their point of contact of relatively enormous volume and arranging said pressure to automatically force said parts together after the material softens, and thereafter break the circuit to volatilize the coating at the point of contact, to form an envelop about the weld and complete the weld before the heating action extends beyond the point of the weld or joint sufficiently to destroy the coating surrounding the joint.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN C. PERRY.

Witnesses:
E. BATCHELDER,
CORNELIUS BEARD, Jr.

Defendant's Exhibit No. 16

1087

No. 690,958. Patented Jan. 14, 1902.

R. M. HUNTER.

METHOD OF ELECTRIC WELDING.

(Application filed Apr. 7, 1898.)

(No Model.)

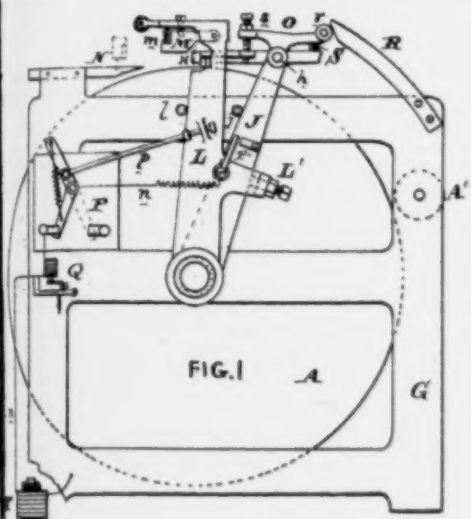


FIG. 1

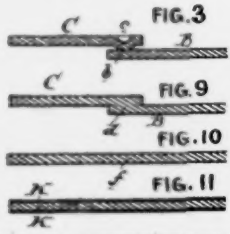


FIG. 3

FIG. 9

FIG. 10

FIG. 11

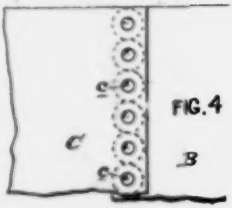


FIG. 4



FIG. 5

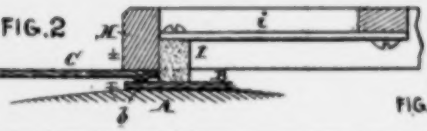


FIG. 2

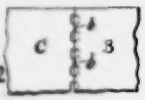


FIG. 12

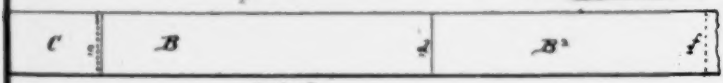


FIG. 6

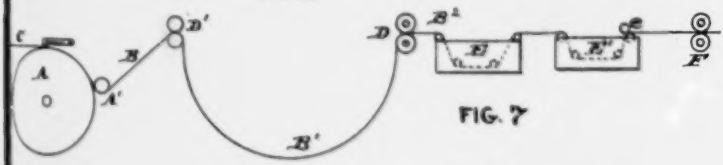


FIG. 7

Attest



FIG. 8

Inventor

UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 690,958, dated January 14, 1902.

Application filed April 7, 1898. Serial No. 676,756. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Methods of Electric Welding, of which the following is a specification.

My invention set out in this application (Case 304) has reference to the manufacture of sheet metal in long lengths by electric welding; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

Heretofore it has been customary to make long lengths of sheet-tin for roofing by connecting the smaller sheets end to end by folded joints; but this has objection from the fact that it forms a heavy seam and is not always proof against leakage. Furthermore, sheets of metal of this character cannot be employed in such industries as the manufacture of sheet-metal cans, pans, &c.

The object of my invention is to provide a method of making continuous lengths of sheet metal, plain, tinned, or coated, and adapted for roofing and general manufactures, the said sheets being without seams and liquid-tight throughout.

In carrying my invention into practice I first manufacture a series of sheets of iron or steel of the requisite width, and these I arrange, two or more, end to end and unite them by electric welding. The welded joints may be subsequently run through cold-plate rolls and the said welded joints rolled down to the same thickness as the rest of the sheet-plate. This sheet metal may then be coated or tinned and finally passed between planishing-rolls, if so desired. The welding of the sheets of iron or steel together is an important feature of my invention, and in carrying out this part of my improvements I provide one end of the sheets with a series of projections, which may be formed by dies and arranged in a transverse line at or adjacent to one end of the plate. When these projections are placed upon or in contact with the other end of the next adjacent sheet, we will have an electrical contact made between the two plates or sheets at a series of separate and preferably equidistant points and adapted for offering a very material resistance. When these plates are pressed into contact and a current of electricity passed from one plate to the other, the welding operation begins at each of the points of contact, and as the metal in the immediate vicinity of the projections on the two plates melts small lakes of molten metal are formed, which quickly spread and unite, making a full transverse weld. Under ordinary conditions of simply lapping the edges and passing a current through from plate to plate the welding would be a failure, since it is impossible to properly control the action of the current and portions would melt and flow away before other parts are welded at all. By my improved method, however, I set up a simultaneous series of gradually-extending welds, which ultimately unite, and thus make it possible to properly unite the two sheets. When the weld is being made, the plates are pressed together as the metal becomes fused. Broadly considered, my invention comprehends the union of two sheets of metal in this manner irrespective of the purposes to which it may subsequently be put.

My invention will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a sheet-metal-welding machine embodying my invention. Fig. 2 is an enlarged sectional elevation of a portion of same. Fig. 3 is a longitudinal section of the lapped sheets before welding. Fig. 4 is a plan view of a portion of same. Fig. 5 is a cross-section of same on the line of the projections. Fig. 6 is a plan view of a long sheet in process of being made by my process. Fig. 7 is an elevation showing my complete apparatus for welding, rolling, and coating diagrammatically. Fig. 8 is a sectional elevation of a apparatus for preparing the ends of the sheets before being welded. Fig. 9 is a longitudinal section of the welded sheets. Fig. 10 is a similar view of the joint after cold-rolling. Fig. 11 is a similar view after the plate has been coated or tinned, and Fig. 12 is a plan view of a modified form of plate-joint for welding.

A is the welding-machine for uniting the sheet C to the rear end of the sheet B. The

1089

long length of sheet metal comprises the portion B', which is fed in the form of a loop by feed-rolls D' and has its joints welded, as indicated at *d* in Fig. 9, and the portion B^2, which has passed through the cold-press rolls D and has its joints reduced to the condition of *f*, Fig. 10, having a uniform thickness with the rest of the sheet. The sheet so prepared may then be coated or plated in any suitable or well-known manner. In Fig. 7 I have shown it as being fed through a bath E of acid to cleanse it and thence through the tinning or galvanizing bath E'. The excess of the coating metal is rubbed off by the rolls *e*, and after cooling it may pass through planishing-rolls F. It is evident that the bath E' may be an ordinary copper-plating bath, if so desired, as will be well understood. The loop B' enables the sheet to be continuously drawn through the press-rolls D and permits the intermittent action of the welding-machine. The rolls D' act as a support arranged in alinement with the face of the horizontal press-rolls D and intermediate of said rolls and the welding means. The loop B' compensates for any variation in the length of the sheet between the welding-machine and press-rolls. It also secures a regular and uniform action in the baths E E'. The coating material, whether it be paint, size, tin, or copper, is indicated in Fig. 11 at K.

I will now describe the welding mechanism. The cylinder A is journaled in a main frame G, and the new sheets to be added are guided by a table N and fed under the clamp H. The clamp H is pivoted at *h* to an arm J, which is in turn pivoted concentrically with the axis of the cylinder A.

I is a block of slate carried on a spring-arm *i*, secured to the clamp H and is adapted to normally be held down below the clamp, so as to act as a stop or guide to receive the end of the metal sheet C to be welded and at the same time hold down the rear end of the previous sheet B. Pivoted at *h* on the end of the arm J is a head O, having a rear arm provided with a roller *r*, adapted to run under the guide R on the main frame, and a forward arm furnished with a set-screw *s* to limit the upward movement of the clamp H. A spring S is interposed between the rear end of the clamp H and the head O under the roller *r* and operates to throw up the clamp and guide on the return stroke and also to make the roller *r* follow the cam R.

L is a second pivoted arm, having its pivot concentric with the arm J and cylinder A. This arm L is adapted to be rocked or reciprocated by hand. It is provided with a stop L', which acts upon the arm J, so that when the arm L is pulled back it draws the arm J with it.

M is a cam pivoted to the arm L and is pressed downward by a spring *m*. In the positions shown in Fig. 1 a stop *j* acts to limit the movement of arm J, and a stop *l* may be used to limit the arm L, though this is hardly necessary in view of the use of the stop L'. The parts J, L, and R are insulated from the main frame.

P is a snap-switch for opening the electric circuit and is operated by a rod *p*, connecting with the arm L. This snap-switch consists of two arms pivoted together and having their free ends connected by a spring. One of the arms is connected with the rod *p*, and the other acts as the circuit-closing contact. When the arm L is moved to the right, the rod *p* is moved to the right until the spring passes beyond the pivot of these arms, when the spring snaps the lower arm over into the dotted position to open the circuit. In closing the circuit the reverse operation occurs.

P' is a circuit-closing switch, part being on arm J and part on arm L.

The electric current from an alternating-current dynamo *t* is transformed by a transformer or induction-coil T into a current of very low tension and great volume, and this is delivered to the main frame G or cylinder A and to the arm J by switch P' and circuit *n*, including the switch P.

The forward ends of the sheets C are prepared in the following manner: The edge is trimmed by shear *g*, and the surface near that edge is formed with a series of projections *b* on one side and depressions *c* on the other, as shown by dies *k*, Fig. 8, or in any other suitable manner. When this end of the sheet C is placed upon the rear end of plate B, we have the construction shown in Figs. 2, 3, and 5. It is evident that the die and shear shown in Fig. 8 may be arranged at N, Fig. 1, in proper position to secure the proper feeding of the sheet.

The operation of the welding-machine will now be understood. The parts being in the positions shown in Fig. 1, the sheet C is thrust in upon the end of the sheet B. The arm L is then moved to the right, causing the cam M to ride over the clamp H and press it firmly down upon the plate C with an elastic pressure. The parts are then in the position shown in Fig. 2. In coming to this position the arm L moves the switch P' to close the secondary circuit *n*, causing the electric current to pass between H and A and between the plates B C by contacts *b*. As the arm L is moved farther to the right its upper part strikes the forward part of the head O and moves the arm J backward. The roller *r* passes under the cam R, compressing the spring S and raising stop *s*. When the welding is completed, the arm L opens the snap-switch P and is then moved to the left. This action releases the clamp H from the cam M, and under the effect of the spring S the clamp H is moved away from the cylinder A. At this time the weld is as shown in Fig. 9. The clamp has raised sufficiently to clear the guide-stop I of the forward edge of sheet C. The movement of the arm L to the left moves the arm J with it through part L', and the several portions of the apparatus return to the posi

tions shown in Fig. 1. The sheet B, with the addition C, is then moved under roller A' and through feed-rollers D', and the operation is repeated with a new sheet. When the arm L first moved to the right to operate the clamp H by the cam M, it immediately closed the switch P' and put on the current. When a small movement to the right of both arms L and J was made, the switch P automatically snapped open to break the current to stop the welding. In the reverse movement the arm L opens the switch P' and subsequently closes the switch P to bring them into position for a new operation. As the welding operation takes place the pressure of the spring *m* causes the clamp H to force the plates C B together as the projections *b* become fused into the surface of the plate B.

An overload-switch Q may be employed to automatically open the circuit when the maximum current flows, so as to prevent any possibility of the lapped body portion of the sheets becoming melted or fusing. The transformer T may be operated on constant-potential mains and have a maximum capacity which may accord with the capacity of the switch Q. This switch Q operates to open the secondary circuit *n* when a sufficiently large current passes through it, said current being dependent upon the resistance presented by the lapped sheets through which the current must pass. As the welding progresses the resistance of the joint decreases and more current flows in the circuit *n*. When this current reaches a maximum, the magnet of the switch Q operates its armature and releases the spring-actuated circuit-closing switch. This prevents abnormal fusing at the welded joint.

It is to be understood that in carrying out this welding operation my invention comprehends the same method whether the points of contact are upon the sides or edges or upon both plates, as the invention comprehends, broadly, the preliminary forming of points or surfaces of contact of less area than the whole surface to be welded and securing the welding operation by causing them to become fused as a preliminary operation to the complete weld. In this manner the weld may be made upon plates butted together, as shown in Fig. 12, the projections or points of contact being upon the edges of one or both plates. In this case the edges are pressed together, as in the other case, during the welding operation. Alternating or direct current may be used, as desired. Plates or sheets of metal united in this manner may be used as roofing-plates, in the manufacture of sheet-metal cans, boilers, tanks, and hardware generally.

If the transformer T is properly proportioned, the current may be just sufficient to produce the welding operation so long as the two lapped parts of the plates are not fully pressed together, and when this latter takes place by the welding the resistance will be so low that the current loses its power to fuse, and the lapped ends will not be melted off or injured. This will insure the process being automatic and adapted to take care of itself to avoid injury to the plates.

I do not confine myself to the details of construction of the apparatus for carrying my invention into practice, as these may be modified without departing from the spirit of the invention.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The method of welding two wide thin flat sheets of metal together to form one continuous sheet which consists of first shaping the end of one or both sheets so as to produce a large number of small projecting portions arranged in line across the sheet or sheets, then overlapping the ends of said sheets so as to bring them in contact alone at a series of small points in the lapped surface of the sheets, then passing a current of electricity simultaneously through all of the series of small points of contact, simultaneously pressing the two sheets together as the metal about the points of contact melts whereby a large series of small fluid portions of metal are formed and gradually increased in area and separated by gradually-decreasing areas of solid or non-fluid portions until the several fluid portions just meet to form a long weld, and then arresting the current to prevent burning off of the ends of the sheets.

2. The herein-described method of electric welding of two wide and thin sheets of metal which consists in placing the two sheets in contact at a large number of small independent points arranged in the line of the weld transversely across the sheets, then passing a current of electricity simultaneously through the series of points of contact and pressing the two sheets together as the welding operation progresses, and continuing the said pressure until the several independent series of welds increase on all sides sufficiently to extend into each other to form one complete and long welded joint.

3. The method of forming a long sheet from two or more sheets of metal, consisting in producing a series of projections upon one of the sheets near its edge, lapping the two sheets so that they make electrical contact through the projections only, passing an electric current through the projections and both sheets, pressing the two sheets together as the weld advances, and finally passing the welded sheets through a pair of rolls to reduce the welded joint to the same thickness as the body of the sheets.

4. The method of forming a long sheet from two or more sheets of metal, consisting in producing a series of projections upon one of the sheets near its edge, lapping the two sheets so that they make electrical contact through the projections only, passing an electric current through the projections and both sheets, pressing the two sheets together as the weld

advances, passing the welded sheets through a pair of rolls to reduce the welded joint to the same thickness as the body of the sheets, and subsequently coating the continuous sheet with an outer covering as a protection to the metal forming the body of the sheet.

5. The method of forming a large sheet of metal from two smaller sheets, consisting in overlapping the adjacent ends of the sheets and holding them in contact at a series of points arranged in line across the sheet so that they are in contact for an area greatly less than the extent of surface required to constitute the completed weld, then passing an electric current through all of the portions of the sheets in contact, and as the welding proceeds forcing the two sheets into greater contact to reduce the electrical resistance and to cause the fluid places in the weld to spread toward each other.

6. The herein-described process of welding consisting in generating a current of electricity of uniform voltage and fixed maximum current, supplying this current to a large series of equally-distributed points of contact in multiple between two sheets to be welded of uniform sectional area and resistance throughout so as to offer a sufficient but subdivided resistance to secure the welding effect at a large number of points simultaneously, then pressing the two sheets together as the welding proceeds until the resistance becomes so low that the current will cease to be sufficient in volume to continue the welding after a given extent of weld has been made, whereby the union of the sheets is secured and the destruction of the lapped portions guarded against.

7. The herein-described process of welding consisting in generating a current of electricity of uniform voltage and fixed maximum current, supplying this current to a large series of equally-distributed points of contact in multiple between two sheets to be welded of uniform sectional area and resistance throughout so as to offer a sufficient but subdivided resistance to secure the welding effect at a large number of points simultaneously, then pressing the two sheets together as the welding proceeds until the resistance becomes so low that the current will cease to be sufficient in volume to continue the welding after a given extent of weld has been made, and automatically interrupting the current when the maximum current required is reached, whereby the union of the sheets is secured and the destruction of the lapped portions guarded against.

In testimony of which invention I hereunto set my hand.

R. M. HUNTER.

Witnesses:
R. M. KELLY,
JOHN P. KELLY.

1092 Defendant's Exhibit No. 17

No. 874,398. PATENTED DEC. 24, 1907.

S. Z. DE FERRANTI.

BLADED TURBINE ELEMENT.

APPLICATION FILED JULY 22, 1907.

3 SHEETS—SHEET 1.



Fig. 2.

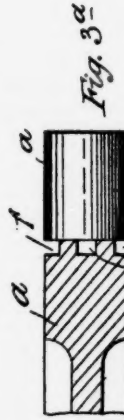


Fig. 3a.

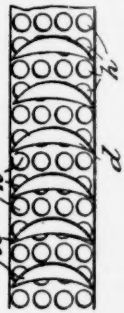


Fig. 6.

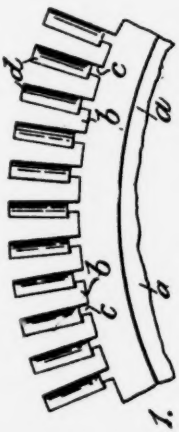


Fig. 1.



Fig. 1a.



Fig. 3

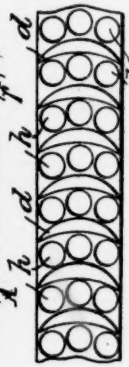


Fig. 5.

Attest:
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S. B. Middleton

Inventor,
Sebastian Ziani de Ferranti
By Spear, Middleton, Donaldson & Spear
Attys.

No. 874,398. PATENTED DEC. 24, 1907.

S. Z. DE FERRANTI.

BLADED TURBINE ELEMENT.

APPLICATION FILED JULY 22, 1907.

3 SHEETS—SHEET 2.

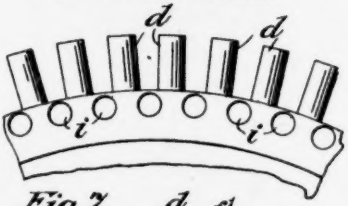


Fig. 7.



Fig. 4.



Fig. 8a



Fig. 9a

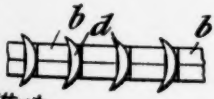


Fig. 10a.

Inventor.

Sebastian Ziani de Ferranti.

By Fraser, Middleton, Maddison & Fraser

Attys.

Attest:

Chas. L. Folson.

S. B. Middleton

No. 874,398. PATENTED DEC. 24, 1907.

S. Z. DE FERRANTI.

BLADED TURBINE ELEMENT.

APPLICATION FILED JULY 22, 1907.

3 SHEETS—SHEET 3.

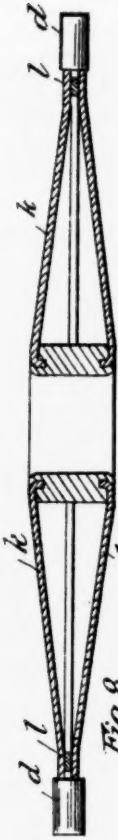


Fig. 8.

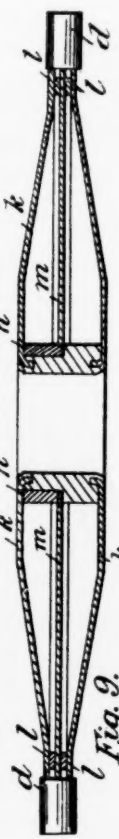


Fig. 9.



Fig. 10.



Fig. 11.

Attest:
Ewd L. Folson
L. B. Middleton

Inventor,
Sebastian Ziani de Ferranti.
By Grear, Middleton, Donaldson & Burlingame
attys.

UNITED STATES PATENT OFFICE.

SEBASTIAN ZIANI DE FERRANTI, OF GRINDLEFORD BRIDGE, SHEFFIELD, ENGLAND.

BLADED TURBINE ELEMENT.

No. 874,398. Specification of Letters Patent. Patented Dec. 24, 1907.

Original application filed May 14, 1904, Serial No. 208,034. Divided and this application filed July 22, 1907. Serial No. 385,056.

To all whom it may concern:

Be it known that I, SEBASTIAN ZIANI DE FERRANTI, a subject of the King of Great Britain and Ireland, residing at Grindleford Bridge, Sheffield, in the county of York, England, (late of 31 Lyndhurst road, Hampstead, London, N. W., England,) have invented a certain new and useful Bladed Turbine Element, of which the following is a specification.

The invention relates to the bladed elements of turbines and has for its object the provision of a bladed turbine element of exceedingly simple construction as regards the attachment of the blades so that caulking strips, lacing or wiring and other complex means employed for fixing the blades may be dispensed with.

A turbine element with the blades welded thereon has hitherto been a desideratum since such a bladed turbine element approaches closely to the ideal form shaped from a solid mass of metal. Difficulties, however, exist in the production of such a bladed turbine element partly on account of the blades and their carrying elements differing largely as regards their power of conducting heat away from the welding point and partly on account of the close juxtaposition of the blades. Thus it is found that the comparatively large volume of metal forming the carrier rapidly conducts heat away from the welding point and prevents the temperature of the carrier rising to the required extent. I overcome all these difficulties, however, by a process described in my patent application, Serial No. 208034, which consists broadly in adjusting the volume of the metal in the neighborhood of the welding point so that approximately equal heating occurs in both faces to be welded and passing electric current through the welding point.

I believe that I am the first to produce a turbine element with the blades directly welded thereto and such a bladed turbine element forms the subject matter of the present invention.

Referring to the accompanying drawings, Figure 1 is a part side elevation of a turbine wheel having cross grooves, Fig. 1ª being an edge view; Fig. 2 shows a similar edge view of a modification in which sets of intersecting grooves are adopted; Fig. 3 shows an edge view of a form having circumferential grooves, Fig. 3ª being a section on the line A A of Fig. 3. Fig. 4 shows, in longitudinal sectional elevation, part of a drum carrier to which the blades are welded in accordance with one form of the invention; Figs. 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disk, while Fig. 7 is a part side elevation in which holes are bored through from face to face of the disk. Fig. 8 shows a sectional plan of a form of wheel built up of two dished disks, held apart at their circumferential portions by distance pieces, Fig. 8ª being a scrap edge view to a larger scale; Fig. 9 is a similar sectional plan of a modified form of wheel built up of three disks, while Fig. 9ª is a corresponding scrap edge view also to a larger scale; Fig. 10 shows a part sectional elevation of a wheel built up of two comparatively thick disks having notched edges. Fig. 10ª being a scrap edge view, while Fig. 11 shows an edge view of a form of wheel built up of a series of "stepped" laminæ.

(It will be seen that all the edge views in the preceding figures are shown as developments for clearness of drawing and not as true projections).

In carrying out the invention according to the form shown in Figs. 1 and 1ª, the turbine wheel or disk is shown at *a*, cross grooves, *b*, being cut in its circumferential edge so as to leave projecting portions of metal, *c*, to which the turbine blades, *d*, are welded. The same object is attained by cutting two intersecting sets of grooves, *e*, in the edge of the disk, as is shown in Fig. 2, or by cutting circumferential grooves, such as *f*, completely round the edge (see Figs. 3 and 3ª).

Fig. 4 shows the invention according to one form applied to the case of a drum blade carrier, a^1; the drum is grooved circumferentially with grooves, f^1, the intervening collars of metal being then cross-cut to form projecting teeth, c^1, on which the blades are welded.

According to a modified form, radial holes, *h*, may be bored a short distance into the edge of the disk, these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in Fig. 5, or arranged without particular reference to the position of the blades, (see Fig. 6).

In Fig. 7, a method is shown of removing

metal in the neighborhood of the welding point by boring holes, *i*, through (or partly through) from face to face of the disk at a radius slightly less than that of its outside edge.

The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficeint areas untouched to insure the mechanical strength in the welded joint.

Referring now to Figs. 8 and 8ª, a form of wheel is shown somewhat diagrammatically which is built up of two dished disks, *k*, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces, such as *l*, disposed at a radius somewhat less than the maximum radius of the disks, the blades, *d*, being welded in position on their outside edges.

Figs. 9 and 9ª show a type of wheel generally similar to that last described but having an intermediate plane disk, *m*, in addition to the two dished disks, *k*; a portion, *n*, of the hub, *o*, is in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, *l*, are indicated as before but any other convenient method of holding the disks in their correct relative position may be adopted.

In Figs. 8 and 9, the dished disks, *k*, are indicated as secured to the hubs, *o*, by pressing the inner edges of these disks into grooves and subsequently burring over the hubs to hold the disks in place.

In the modification shown in Figs. 10 and 10ª, two dished disks, *k*, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, *b*, being cut in their edges in accordance with the method described above with reference to Figs. 1 and 1ª. Again, that portion of the disk carrying the blades may be built up of a set of thin laminæ, *r*, (see Fig. 11), the edges of which are notched as at *s*, the laminæ being assembled in such a way that the notches, *s*, are "stepped" with regard to each other, so that the intervening projections of metal may follow the shape of the turbine blades to be welded to them.

Instead of notching the laminæ, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

In this invention, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the scope is sufficiently indicated by the many examples given above and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described above by way of example.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:-

1. A turbine blade carrier having blades welded directly thereto.

2. A turbine blade carrier with blades attached thereto wholly by welding.

3. A turbine blade carrier having blades attached thereto by welds, certain working stresses on said blades being transmitted to said carrier through said welds.

4. A turbine blade carrier having blades attached thereto by welds, certain bending stresses due to impact of fluid on said blades being transmitted to said carrier through said welds.

5. A turbine rotor having blades attached thereto by welds, certain working stresses on said blades being transmitted to said rotor through said welds.

6. A turbine blade carrier having blades attached thereto by welds and recesses in the carrier in the neighborhood of said welds.

7. A bladed turbine element, comprising in combination a blade carrying element, the volume of the peripheral portion of which in the neighborhood of the point of attachment of the blades has been so adjusted as to retard flow of heat away from said point of attachment together with blades welded to said carrying element.

8. A bladed turbine element comprising in combination a blade carrying element from the peripheral portion of which metal has been removed in the neighborhood of the point of attachment of the blades so as to retard flow of heat away from said point of attachment together with blades welded to said carrying element.

9. A bladed turbine element comprising in combination a blade carrying element having depressed portions on its peripheral area with intervening portions raised relatively to said depressed portions and blades welded to said relatively raised portions.

10. A bladed turbine element comprising in combination a body portion, blade carrying members proper attached to said body portion by one face and having blades welded to an opposite face together with spaces intervening between said blade carrying members proper.

11. As a new article of manufacture, a bladed turbine element having a plurality of spaced blades attached to the periphery of said carrier by direct butt welds.

12. A bladed turbine element comprising in combination a blade carrying element having a circularly disposed aggregation of depressed portions alternating with relatively raised portions and blades welded to said relatively raised portions.

13. A bladed turbine element comprising in combination a body portion; a circularly disposed aggregation of blade carrying mem-

bers proper attached to said body portion by one face and having blades welded to an opposite face together with spaces intervening between said blade carrying members proper.

14. A bladed turbine element comprising in combination a blade carrying element having a plurality of raised portions regularly spaced along said carrying element and blades welded to said raised portions.

15. A bladed turbine element comprising in combination a circular blade carrying element having a peripheral portion, a plurality of raised portions regularly spaced along said peripheral portion and blades welded to said raised portions.

In testimony whereof, I affix my signature in presence of two witnesses.

SEBASTIAN ZIANI DE FERRANTI.

Witnesses:
ALBERT E. PARKER,
HENRY H. GRUNING.

1098

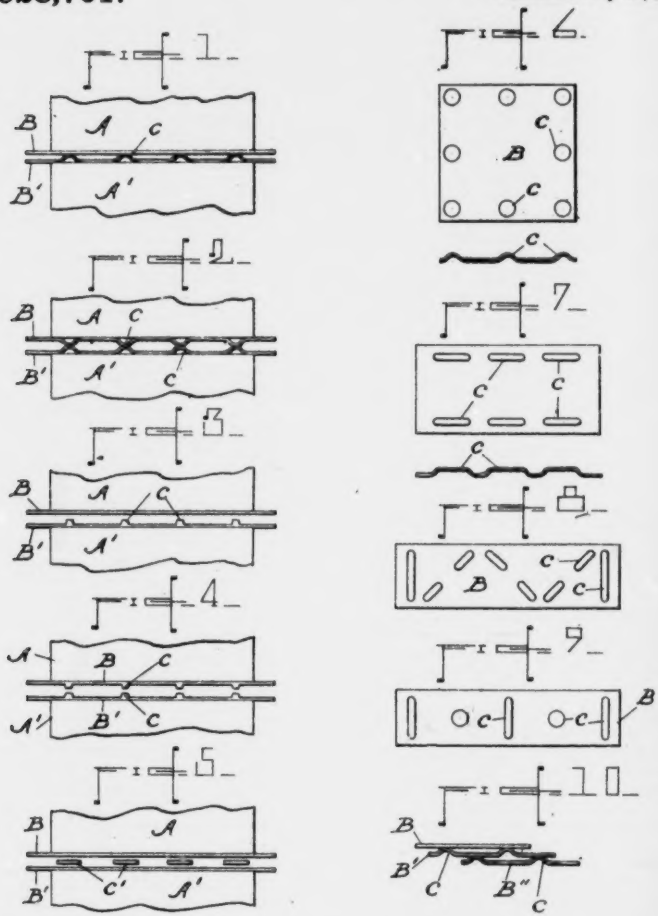
Defendant's Exhibit No. 18

A. F. RIETZEL.

UNITING THE COMPONENT PARTS OF COMPOSITE SHEET METAL STRUCTURES.

APPLICATION FILED FEB. 24, 1906.

928,701. **Patented July 20, 1909.**



WITNESSES:

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Edward Cole

INVENTOR

Adolph F. Rietzel

BY

Townsend & Sherman

ATTORNEYS

1099

UNITED STATES PATENT OFFICE.

ADOLPH F. RIETZEL, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THOMSON ELECTRIC WELDING COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MAINE.

UNITING THE COMPONENT PARTS OF COMPOSITE SHEET-METAL STRUCTURES.

No. 928,701. Specification of Letters Patent. Patented July 20, 1909.

Application filed February 24, 1905. Serial No. 247,081.

To all whom it may concern:

Be it known that I, ADOLPH F. RIETZEL, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, (with post-office address Lynn, Massachusetts,) have invented certain new and useful Improvements in Uniting the Component Parts of Composite Sheet-Metal Structures, of which the following is a specification.

My invention relates to the manner of uniting or fastening two pieces of metal to one another and its object is more particularly to afford a substitute for the manner of uniting pieces of metal as heretofore practiced in the art of electric welding.

As applied to sheet metal manufactures the object is to afford a cheap and practical substitute for riveting and other methods of mechanically securing the two pieces of metal together. As applied to this branch of the metal working arts, the invention affords a means whereby articles of composite sheet metal manufacture may be made up by fastening the pieces of metal constituting the structure with a perfectly secure union and by a process that can be economically conducted.

Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots.

By the terms "weld" and "electric weld", as herein employed, I refer to that process of welding in which the metal is brought to plastic condition by passing an electric current from one to the other of two pieces where they are in contact and is welded while in such condition by the application of pressure, as contra-distinguished from a process of uniting metals, which is described in a patent to Bernardos, No. 363,320, dated May 17, 1887, and in which the union is effected by melting the metal by an arc and which is different from "welding" in the ordinary sense of the term as applied to metal manufactures, in that the metal is heated beyond the point of plasticity and pressure is not employed.

It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces. It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces. A weld formed according to my invention is distinguished however from such prior welds by the fact that the opposed surfaces are welded together in spots only, the heating electric current being localized or confined in any desired way to such spots so that the major portion of the opposed surfaces will not be involved in the welding, although they may, after the completion of the operation, lie in contact with one another or very close together.

My invention is particularly valuable in fastening of pieces of sheet metal together because not only does it limit the amount of electric energy required very considerably as compared with the prior methods of union, but it also diminishes the liability to burning of the metal which is liable to occur when the attempt is made to form a union of two sheets of metal by an electric welding process over substantially the whole area of the meeting or opposed surfaces.

In carrying out my invention any desired number of spots of union may be employed, such number depending obviously upon the extent of the meeting surfaces which are to be fastened together and also upon the strength of the union desired.

In carrying out my invention the localization of the flow of heating electric current and of welding pressure to the desired spot or spots may be brought about in any desired way. One of the preferred ways is by providing between the meeting surfaces or portions of the pieces to be united suitable conducting projections or points at the spots of union, which projections or points carrying the heating electric current from one piece to the other are so located in the meeting surfaces and are so separated from one another that on the application of the weld-

1100

ing pressure the welded union resulting will be localized in the area of the opposed surfaces and will be substantially coextensive in area with the restricted area of the path of the effective heating current. Various ways of providing such points or projections will occur to those skilled in the art.

The preferred method is to indent the metal from the side reverse to that on which the union is effected by a suitable tool, the projections thus formed affording points for the passage of the electric current. This method is preferable also because it permits the welding to be produced at a multiplicity of spots simultaneously through the application of pressure over the whole rear surface of the plate, the points or projections in that case serving not only to localize the flow of the heating current but also to localize the welding pressure.

In the preferred manner of carrying out my invention in the case of sheet metal manufacture I provide projections from the meeting surfaces of both pieces that are to be united. Said projections may also be provided by interposing between the two plane sheets small pieces of conducting material which act in the same manner when the sheets are brought together, as projections which localize the heating current and the pressure. It will be understood, however, that in the latter instance as in the former, these pieces are so small and are placed such a distance apart that on the application of welding pressure there will be no running of the welds into one another but that the final union will be in spots only leaving well-defined areas on the meeting surfaces, in which the surfaces either lie in contact or separated from one another by a very thin space.

From the foregoing it will be seen that my invention is distinguished from prior methods of welding pieces of metal together in that it may be very cheaply practiced, because no attempt is made to weld over the whole of the opposed surfaces of the welded pieces; but on the contrary the union is at a spot or spots only which in ordinary cases will afford as strong a union as would be produced by the riveting of the pieces.

The invention further has the advantage that not nearly so much electric energy is required as is necessary when the electrically welded union extends over the whole area of the opposed surfaces. Moreover, the danger of burning when the attempt is made to weld two sheets of metal together by a lap weld is largely eliminated.

In the accompanying drawings Figures 1, 2, 3, 4 and 5 illustrate some of the ways in which the pieces of metal to be united may be prepared for the welding according to my invention. Figs. 6, 7, 8, and 9 show modifications in the form and disposition of the contact projections which result in the spots of electrically welded union. Fig. 10 shows the assembling of three plates together for welding according to my invention.

In the various figures of the drawing the invention is illustrated as carried out with two sheets of metal B. B'. In Fig. 1, plate B'. only is provided with the distinct or isolated spots (*c*) or projections for the flow of the electric current, to the plate B. which spots or points may be formed by indenting the plate with a suitable tool. The spots are located so far from one another that on the application of pressure coincidently with the flow of electric current from one plate to the other there will be a number of distinct areas or spots of electrically welded union of the plates separated by well-defined areas on the meeting surfaces in which no union takes place. The resultant is however a fastening of the plates together securely and which is practically as effective as if the attempt were made to form a welded union over the entire areas of the meeting surfaces. Obviously, the greater the distance between the spots the lesser the number that would be used and hence the lesser the consumption of energy in effecting the weld. This is of considerable importance where the meeting areas are large or where a considerable amount of work has to be done. The welding pressure is conveniently applied by conducting-blocks or electrodes, A, A', between which the two pieces B, B', are assembled. These electrodes, A, A', furnish the heating current while applying the pressure, the localization of the pressure in the spots being brought about in this instance by the pointing of the surfaces at point *c*.

In Fig. 2 both plates are provided with projections the points of which engage with one another, the pointing being produced by indenting the metal sheets from the rear.

Fig. 3 illustrates the localization of the welding by casting projections upon one of the sheets and Fig. 4 by casting projections on both pieces. The localization of the welding in spots might be effected as illustrated in Fig. 5 by interposing small pieces of metal at the spot or spots of desired union, these pieces operating when the plates are brought together in the same way as the projections before referred to. The number and size of the pieces and their distance apart is in this case, as before, so chosen that the application of pressure together with the flow of heating current from one plate to the other will result in a union of the two pieces over their opposed surfaces in spots only thereon.

Fig. 6 shows how the spots might be disposed to fasten the pieces together in distinct spots around their edges.

As shown in Figs. 7 and 8 the projections, instead of being round, might be somewhat elongated and irregularly or symmetrically arranged.

Fig. 9 shows round and somewhat elongated projections combined.

In all these instances however, the union over the surfaces of the plates is confined to spots or areas which are of comparatively small extent as compared with the total area of the meeting surfaces. As will be obvious, the form and disposition of the points or projections of initial contact for flow of the electric current and localization of the pressure may be greatly varied without departing from my invention.

Fig. 10 illustrates the welding of three plates of sheets together when superposed.

My invention is especially useful in the manufacture of articles from sheet metal which are stamped out to different forms, and which have heretofore had their component portions united by riveting or other purely mechanical expedient which is not only expensive but requires generally special tools and results in many cases in an insecure union. When the invention is employed in its preferred form or manner of practice in the field of sheet metal manufacture all that is necessary is to provide the contact spots or projections as already described and then to assemble the pieces in an electric welding machine and weld them together as already set forth.

The product of the foregoing process is readily distinguishable from that produced by melting down the metal of the pieces from the back at spots as proposed in the before mentioned patent of Bernardos in that there is no substantial alteration of condition of the metal back of the welds appearing as a burning, roughening or disintegration of the material by the very great heat of the electric arc employed for melting down the metal, and by the further fact that the unions themselves in the material of the juxtaposed or opposite faces have the characteristics of a true weld produced by bringing the metal to welding temperature only and applying pressure, so that the pieces are solidly and firmly united and cannot be readily torn apart as they could be if the metal at the spots has been melted down under the high temperature of the electric arc.

The product in the form of sheet metal is further particularly useful for sheet metal ware since the outer or exposed surface of the metal will have the smooth and practically unaltered finish of sheet metal and said surface will not be substantially marred when the process is properly conducted, excepting for the presence of such infrequent small depressions as might remain from the previous indentation of the metal from the back when, as hereinbefore described, an indenting of the metal may be resorted to.

The product in sheet metal also possesses the advantage that the spots of welding when located within the edges of the meeting surfaces will not show. The product is also superior to that produced by riveting of the plates in that there are no rivet heads to mar the finish of the back or outer surfaces of the metal.

What I claim as my invention is:

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

7. The method of welding two pieces of metal together, consisting in superposing said pieces with their surfaces at which the union is to take place superposed or pre-

1102

sented to one another, pressing the pieces together, and passing a heating electric current from one to the other while localizing the heating current simultaneously in a number of distinct or separate spots of limited area, separated from one another sufficiently to secure a union of the pieces in a number of corresponding distinct spots surrounded by and separated from one another by distinct areas in which no union exists.

8. The method of uniting two pieces of metal, consisting in providing between their meeting surfaces a number of projections, spaced apart as described, pressing the pieces together and passing an electric current through said projections while confining the welding area of such current to said projections so as to leave distinct areas around spots in which no welding shall be produced.

9. The method of fastening two plates of metal together at a multiplicity of distinct or separate points of welded union, consisting in providing between them a number of isolated contact spots adapted to pass an electric current from one to the other but so separated that the electric welds will be separated from one another by unwelded areas, passing a heating electric current through such spots simultaneously and applying pressure as and for the purpose described.

10. The herein described method of electrically welding two plates or sheets of metal of any gage together by distinct spots of union disposed over their plane surfaces, consisting in providing a multiplicity of electrical contact spots coincident with the separated spots of union and disposed at such distances apart that there will be well-defined areas between spots through which the electric current will not flow, passing electric current from one plate to the other through said contact spots simultaneously and applying pressure as and for the purpose described.

11. The method of fastening two sheets of metal together, consisting in providing between them a number of isolated contact spots for the passage of the electric welding current, said spots being adapted to initially hold the plates apart and being separated from one another a sufficient distance to confine the welding to distinct areas or isolated spots, passing a heating electric current through a number of said contact spots simultaneously and pressing the plates together as and for the purpose described.

12. The method of fastening two plates of metal together, consisting in furnishing a surface of said plates with a number of projecting contact spots for the passage of welding electric current and disposed at such distances apart that on the application of pressure the welds will not run into one another, superposing said plates, passing a heating electric current from one to the other over said separated spots and applying the pressure to produce a spot-welding of the plates to one another as and for the purpose described.

13. The herein described method of fastening two pieces of metal together by providing each plate with a number of projecting contact spots on its plane surface disposed at such distances apart that the unions will not run into one another but will, nevertheless, firmly hold the plates together, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other through the spots and simultaneously applying pressure thus uniting the plates at a number of distinct points of welded union.

14. The method of uniting two sheets of metal face to face, consisting in indenting the material, superposing the plates with the points of the indentations engaged, passing an electric current from one plate to the other through said points simultaneously, and applying pressure while confining the area of heating to welding temperature to a circumscribed area or spot entirely surrounded by areas unheated to welding temperature to unite the pieces in a distinct spot or spots of small extent in the whole area of the opposed faces.

15. The herein described method of fastening two plates together at a multiplicity of distinct mechanically separated points of welded union, consisting in indenting each plate to form a number of projecting contact spots on the plane surfaces which are to abut, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other thereby forming a number of distinct zones or points of heated metal, heated to welding temperature, and applying pressure to complete the union of plates by a number of mechanically distinct unions.

16. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

Signed at Lynn in the county of Essex and State of Mass. this 7th day of Feb. A. D. 1905.

ADOLPH F. RIETZEL.

Witnesses:

EDWIN W. HAWES.

E. I. FOSTER.

DISCLAIMER.

928,701.—*Adolph F. Rietzel*, Lynn, Mass. UNITING THE COMPONENT PARTS OF COMPOSITE SHEET-METAL STRUCTURES. Patent dated July 20, 1909. Disclaimer filed June 12, 1915, by the assignee, *Thomson Electric Welding Company*.

Enters this disclaimer to that part of the invention described in said patent which is set forth in the specification in the following words:

"Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots"—except when that process is carried out by the preferred method of providing conducting projections or points between the meeting surfaces of the pieces to be united; and also enters its disclaimer to that part of the claim in the specification which is in the following words:

"1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

"2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

"3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

"4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

"5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

"6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

"16. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

"17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

"18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portions of the pieces back of the welds being substantially unaltered, as and for the purpose described.

"19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

"20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points."—(*Official Gazette, June 22, 1915.*)

Disclaimer in Letters Patent No. 928,701.

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Defendant's Exhibit No. 19

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S. Z. DE FERRANTI.

PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221. Patented July 27, 1915.

3 SHEETS—SHEET 1.



Fig. 2

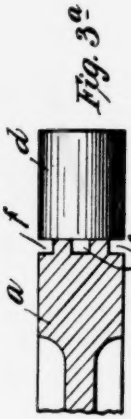


Fig. 3a

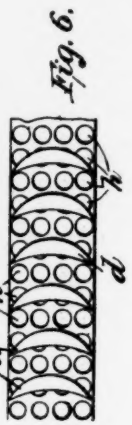


Fig. 6.



Fig. 1.



Fig. 1a.



Fig. 3.



Fig. 5.

ATTEST.
Middleton
Edward Barton

INVENTOR
SEBASTIAN Z. DE FERRANTI.
By Dyer, Middleton, Donaldson & Dyer ATTYS.

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S. Z. DE FERRANTI.

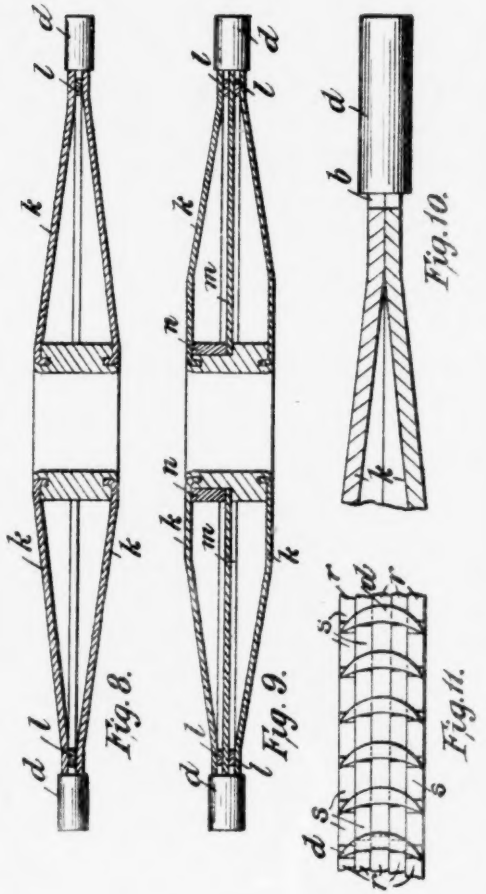
PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221.

Patented July 27, 1915.

3 SHEETS—SHEET 2.



ATTEST:
C. F. Middleton
Edward Sarton

INVENTOR
SEBASTIAN Z. DE FERRANTI.
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ATTYS.

1197

S. Z. DE FERRANTI.

PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221. Patented July 27, 1915.

3 SHEETS—SHEET 3.



Fig. 4

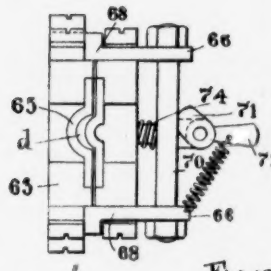


Fig. 12.



Fig. 8a

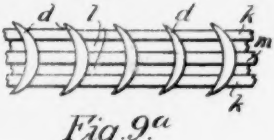


Fig. 9a

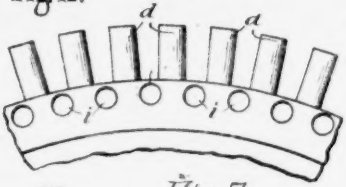


Fig. 7.



Fig. 10a

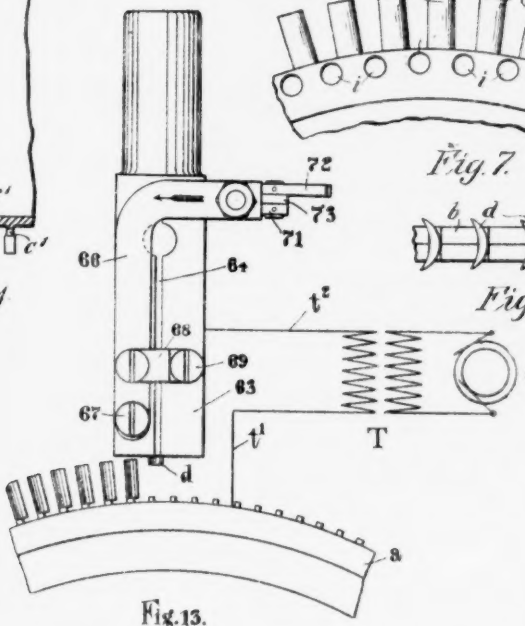


Fig. 13.

WITNESSES

M. Barrett

L. Alden

Sebastian Z. de Ferranti INVENTOR

BY Spear, Middleton, Donaldson & Spear

ATTORNEYS

UNITED STATES PATENT OFFICE.

SEBASTIAN ZIANI DE FERRANTI, OF HAMPSTEAD, LONDON, ENGLAND.

PROCESS FOR ELECTRICALLY WELDING TURBINE-BLADES.

1,148,221. Specification of Letters Patent. Patented July 27, 1915.

Application filed May 14, 1904. Serial No. 208,034.

To all whom it may concern:

Be it known that I, SEBASTIAN ZIANI DE FERRANTI, a subject of the King of Great Britain and Ireland, and residing at 31 Lyndhurst road, Hampstead, London, N. W., England, have invented a certain new and useful Process for Electrically Welding Turbine-Blades, of which the following is a specification.

The invention relates to the electrical welding of turbine blades on to the wheels, rings or drums carrying them and has for its object to overcome the difficulties which have been experienced in electrically welding together two such parts differing considerably as regards their power of rising to the required welding temperature when heated at the point of junction, so that blade carrying elements with welded blades may be reliably produced in an inexpensive manner.

The main difficulty arises through the blades and their carriers differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the carrier to which it is to be secured, it is found that the comparatively large volume of metal forming the carrier, rapidly conducts heat away from the welding point thus preventing the temperature of the carrier rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of the blade carrying element in the neighborhood of the welding point so that approximately equal heating occurs in both faces to be welded.

Referring to the accompanying drawings which, with the exception of Figure 4, show the invention applied, by way of example, to a type of parallel flow turbine in which the blades are mounted on the edge of a wheel like body, Fig. 1 is a part side elevation of such a wheel having cross grooves, Fig. 1ª being an edge view; Fig. 2 shows a similar edge view of a modification in which sets of intersecting grooves are adopted; Fig. 3 shows an edge view of a form having circumferential grooves, Fig. 3ª being a section on the line A A of Fig. 3; Fig. 4 shows, in longitudinal sectional elevation, part of a drum carrier to which the blades are welded in accordance with one form of the invention; Figs. 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disk, while Fig. 7 is a part side elevation in which holes are bored through from face to face of the disk; Fig. 8 shows a sectional plan of a form of wheel built up of two dished disks, held apart at their circumferential portions by distance pieces, Fig. 8ª being a partial edge view to a larger scale; Fig. 9 is a similar sectional plan of a modified form of wheel built up of three disks, while Fig. 9ª is a corresponding partial edge view also to a larger scale; Fig. 10 shows a part sectional elevation of a wheel built up of two comparatively thick disks having notched edges, Fig. 10ª being a partial edge view, while Fig. 11 shows an edge view of a form of wheel built up of a series of "stepped" laminæ and Figs. 12 and 13 show a form of clamp and a diagram of the electrical connections.

(It will be seen that all the edge views in the preceding figures are shown as developments for clearness of drawing and not as true projections.)

The same reference symbols are, when possible, used in the accompanying drawings to denote similar parts.

In carrying out the invention according to the form shown in Figs. 1 and 1ª, the turbine wheel or disk is shown at *a*, cross grooves, *b*, being cut in its circumferential edge so as to leave projecting portions of metal, *c*, to which the turbine blades, *d*, are welded. The same object is attained by cutting two intersecting sets of grooves, *e*, in the edge of the disk, as is shown in Fig. 2, or by cutting circumferential grooves, such as *f*, completely around the edge (see Figs. 3 and 3ª.)

Fig. 4 shows the invention according to one form applied to the case of a drum blade carrier, *a'*; the drum is grooved circumferentially with grooves, *f'*, the intervening collars of metal being then cross-cut to form projecting teeth, *c'*, on which the blades are welded.

According to a modified form, radial holes, *h*, may be bored a short distance into the edge of the disk, these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in Fig. 5, or arranged without particular reference to the position of the blades, (see Fig. 6).

In Fig. 7, a method is shown of removing

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metal in the neighborhood of the welding point by boring holes, *i*, through (or partly through) from face to face of the disk at a radius slightly less than that of its outside edge. The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficient areas untouched to insure the mechanical strength in the welded joint.

Referring now to Figs. 8 and 8ª, a form of wheel is shown somewhat diagrammatically which is built up of two dished disks, *k*, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces such as *l*, disposed at a radius somewhat less than the maximum radius of the disks, the blades, *d*, being welded in position on their outside edges.

Figs. 9 and 9ª show a type of wheel generally similar to that last described but having an intermediate plane disk, *m*, in addition to the two dished disks, *k*; a portion, *n*, of the hub, *o*, is in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, *l*, are indicated as before but any other convenient method of holding the disks in their correct relative position may be adopted.

In every case it will be seen that those portions of the carrier to which the blades are to be welded are partially isolated from the body of the carrier by slots, holes and so forth so as to limit the cross-sectional area available for the conduction of heat, and so compel the carrier to rise to the welding temperature. On the other hand to prevent the blades being burnt away, their mass is artificially increased by holding them between clamps or jaws of high heat conductive material such as copper. Thus referring to Figs. 12 and 13, the jaw holder 63, is separated into two branches by means of the slot, 64, each branch carrying a copper jaw, 65, shaped so as to clear adjacent blades. Between the jaws, 65, the blade to be welded is clamped, so as to leave the tip only exposed as seen in Fig. 13, and in order to insure a good contact and rigid holding of the blade in the jaws, a clamping device is preferably arranged in addition to that provided by the spring of the two branches of the jaw holder.

According to the form shown links, 66, are pivoted at 67, to one branch of the jaw holder, while short cross links, 68, connect the links, 66, to the other branch to which they are pivoted at 69. The long links, 66, are curved as shown, and are connected at their non-pivoted ends by the cross-piece, 70, to which pressure to clamp the blade is applied in the direction of the arrow (see Fig. 13) by means of the cam, 71, and the hand lever, 72, both of which are secured to a common axle rotatably mounted on any convenient support, 73. A spring such as 74, serves to return the links when the blade is released.

The necessary electrical connections to affect the welding are shown diagrammatically in Fig. 13, in which G represents an appropriate source of alternating current, and T, a transformer. It will be seen that while the lead, *t'*, may be connected directly to the carrier *a*, as in the example shown, it is necessary on the other hand that current to the blade, *d*, should be conveyed indirectly by way of the jaw holder, 63, and lead, t^2.

In Figs. 8 and 9, the dished disks, *k*, are indicated as secured to the hubs, *o*, by pressing the inner edges of these disks into grooves and subsequently burring over the hubs to hold the disks in place.

In the modification shown in Figs. 10 and 10ª, two dished disks, *k*, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, *b*, being cut in their edges in accordance with the method described above with reference to Figs. 1 and 1ª. Again, that portion of the disk carrying the blades may be built up of a set of thin laminæ, *r* (see Fig. 11) the edges of which are notched as at *s*, the laminæ being assembled in such a way that the notches, *s*, are "stepped" with regard to each other, so that the intervening projections of metal may follow the shape of the turbine blades to be welded to them.

Instead of notching the laminæ, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

In an invention such as the present, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the scope is sufficiently indicated by the many examples given above and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described above by way of example.

The electric heating current is passed directly through the carrier and by way of clamps through the blades.

By means of my invention it will be seen that the blades are attached to their carrying elements in an expeditious and efficient manner while in the case of rotors a still further advantage is obtained over the methods of blading commonly employed inasmuch as if properly carried out the attachment of the blades by electric welding introduces no change of symmetry with respect to the axis of rotation and consequently dispenses with the tedious operation of balancing otherwise rendered necessary.

LOSE IN CENTER

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. The method of attaching turbine blades to their carrier of relatively great mass which consists in adjusting the heat capacity of the localized area of the carrier at the point of attachment by partially isolating these areas from the remainder of the carrier so that a welding temperature may be reached notwithstanding the cooling effect of the mass of the carrier, and passing a uniform electric heating current directly through the carrier and by way of the clamps through the blades to weld the blades in succession to the carrier, substantially as described.

2. The method of attaching turbine blades to their rotor carrying elements one by one, consisting in equalizing the heat capacity of the welding parts by limiting the conducting areas of the carrier at the points of blade attachment symmetrically in relation to the axis of rotation of the rotor, and inclosing the blades between clamps so that on heating locally by a uniform electric current, the blades and carrier rise to approximately the same temperature on welding the blades to the carrier so prepared, substantially as described.

3. Process for the attachment of turbine blades to their carriers consisting in partially isolating those portions of the carrier in the neighborhood of the points of attachment of the blades, to limit the cross-sectional area available for the conduction of heat therefrom; artifically increasing the volume of the blades by contacting them with metal masses of high heat conductive capacity and finally welding together the carriers and blades so prepared.

4. Process for the attachment of turbine blades to their carriers, consisting in forming circumferential grooves with intervening rings of metal around the carrier thereby limiting the cross sectional area available for the conduction of heat from the point of attachment so that on heating locally, said blade and said carrier rise to approximately the same temperature and welding each blade to a plurality of said rings, as set forth

5. The method herein described of constructing a turbine wheel, ring or drum, the same consisting first in forming said wheel symmetrically in relation to its center of rotation with the parts next to the welding points reduced to properly conform to the volume of the blades and electrically welding said blades at the said points whereby the symmetry of the wheel is maintained.

In witness whereof I have hereunto set my hand in presence of two witnesses.

SEBASTIAN ZIANI DE FERRANTI.

Witnesses:
FRANCIS JAMES BIGNELL,
WALTER J. SKERTEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

Defendant's Exhibit No. 20.

No. 20

S—300.

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the Complete Specification and Drawings, in the matter of the

British Letters Patent to

Charles Frederick Parkinson and Walter Gatwood,

Dated July 28, 1894, Number 14,536,

for

Improvements in Apparatus for Heating and Welding by Electricity.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 24th day of March in the year of our Lord one thousand nine hundred and nineteen, and of the Independence of the United States of America the one hundred and forty-third.

J. McClay

Acting Commissioner of Patents.

4-5m

In working, the secondary current induced in the core of the transformer is carried through the core to the base and then by the upright pillars or supports to the top plate and returned to the core when the circuit is completed through the part of the wheel or other article to be welded to the bottom plate which is electrically connected to the end of the core.

The V pieces which form the gluts are cut to the desired size and placed in position at the junction of the spokes while cold and the two (spokes and glut piece) are heated together to a welding heat and then compressed by the hydraulic rams.

Dated this 25th day of July 1894.

WM. P. THOMPSON & Co.,
6, Bank Street, Manchester, Patent Agents.

COMPLETE SPECIFICATION.

Improvements in Apparatus for Heating and Welding by Electricity.

We, CHARLES FREDERICK PARKINSON, of Wellington Terrace, Morecambe, in the County of Lancaster, Electrical Engineer, and WALTER GATWOOD, of Derwent Road, Lancaster, in the said County, Mechanical Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention is designed to provide an apparatus for welding metals by means of electric currents passed through the articles to raise them to welding heat.

It is primarily designed and arranged for glutting wheel spokes and bossing railway wagon and carriage wheel centres but the several parts may be arranged to suit other descriptions of work or to act upon articles of different shape.

The invention consists essentially in constructing the apparatus with one or more alternating or continuous current transformers or generators working in conjunction with a number of hydraulic cylinders and rams the transformers or generators being connected with the bed plate or support upon which the articles are placed so that the current passes through that part of the article or at the point which is required to be treated and maintains it at the desired temperature whilst the hydraulic rams compress it and effect the welding.

The invention will be fully described with reference to the accompanying drawings in which as an example a machine is shown for heating and welding railway carriage wheels.

Fig. 1. Elevation.

Fig. 2. Sectional elevation through two opposite cylinders, with rams removed showing section through transformer.

Fig. 3. Plan

Fig. 4. Longitudinal section of single cylinder.

Fig. 5. End elevation of same.

Fig. 6. Plan of parts of same.

In the apparatus illustrated for glutting wheels the number of hydraulic cylinders A and rams B and B¹ employed correspond with the number of spokes of the wheel C to be operated upon and these are arranged on a circular bed D radiating from a common centre.

At or near the centre of the apparatus in front of the hydraulic cylinder is placed an electrical transformer E preferably arranged for alternating currents. The secondary coil F of the transformer terminates with two star shaped poles G and H which also act as slides upon which sliding contact pieces or carriages I and J are capable of being moved to and fro. The top pole or star shaped piece of copper G carries the sliding pieces or carriages I and the bottom pole H the

upright sliding contact pieces J. The pieces J are preferably made in the form of or as part of a choking coil which when in use acts as a regulator to choke back the current and reduce the heating effect. A central pin K is provided to hold and support the wheel C whilst being heated and welded. It is fixed to but insulated from the secondary coil F of the transformer.

The contact pieces or carriages I connected to the top pole G carry the contact arms L which fit against the spokes of the wheel at the point to be heated. To the contact arms L may be fitted adjustable clamps L^1 to fit the radius of a larger wheel C^1 (a portion of which is shown in plan).

The upper end of the upright contact piece or carriage J connected to the lower pole H forms the slide for the contact block M which is caused to move to and fro therein by the forward or backward movement of the hydraulic ram B. Over and under the contact block M are placed die pieces b b^1 which are moved to and fro by the hollow hydraulic ram B^1.

The hydraulic cylinders A are arranged with a cast iron base or slide A^1 to which they are bolted. The slide or base A^1 is mounted on a circular bed plate D upon which they can be adjusted to any suitable position the number and position of the cylinders being regulated according to the number of spokes to be welded. The position of the cylinders can be adjusted circumferentially on the bed plate D and radially upon the slide or base A^1. The hand wheel S and screw s are arranged to move the cylinders to give the required adjustment on a radial line the screw being supported on a bracket a at the back of the base A^1.

Each cylinder A contains two rams, a solid one B and a hollow one B^1 the one sliding or working inside the other. Instead of two rams one working inside the other each cylinder may be constructed with two chambers separated by a division plate or diaphragm in which the ram works.

To the end of the ram B is fitted the sliding contact block M which moves to and fro in the slide formed by the upper end of the contact piece or carriage J and to the end of the hollow ram B^1 are fitted the die pieces b b^1 which move to and fro with it through recesses cut in the upper and lower sides of the contact block M.

Each sliding contact piece or carriage I is connected to the ram B of the corresponding hydraulic cylinder A by the connecting rod N and lever n which are pivoted together and to the fixed bracket N^1 the bracket N^1 being affixed to though insulated from the upright contact piece J.

The outward movement of the ram B carries forward the contact block M which makes contact with the glut piece C^{11} and holds it firmly against the outer rim of the wheel C at the same time bringing the contact arms L against the inner face of the wheel thereby completing the secondary circuit through the part of the wheel C and glut piece C^{11} to be heated. W W^1 are the primary leads.

Each of the upright contact pieces J is coupled to the corresponding cylinder by a connecting link R coupled to an eye bolt r in the face of the cylinder so that as the cylinder is moved back or forward to adjust its position to the size of wheel (or other work) the contact piece J is moved to or fro at the same time and by reason of the connecting rod N and lever n of the contact piece I being pivoted on the bracket N^1 its position is at the same time adjusted.

The water is admitted to the hydraulic cylinders A from the pipes T T^1 T^{11}. The pipe T admits to the back of the cylinder to move forward the ram B the pipe T^1 admits to the centre of the cylinder to propel forward the hollow ram B^1 and the pipe T^{11} admits to the front end of the cylinder to move both rams back again. Suitable valves are applied to these pipes and to the cylinder for controlling the flow of the water to the cylinder and the exhaust from it. The pipes T T^1 T^{11} each terminate in castings V V^1 V^{11} into which the small pipes t t^1 t^{11} slide being suitably packed so that when the position of the cylinders is altered they are free to slide with them. The upright part of the pipes T T^1 T^{11} may be of any suitable flexible piping to allow for the lateral movement of the cylinders.

N° 14,536.—A.D. 1894.

The secondary coil may be fitted with flexible pipe to allow of water circulating about it to keep the contacts cool.

Although one special form of machine is described and illustrated applicable for glutting railway carriage and wagon wheels it is to be understood that the construction of the apparatus may be varied to suit different forms of work.

In the construction of the machine several transformers may be employed placed diametrically opposite each other the secondary circuits of which are directly connected to the work in hand thus separate transformers can be applied to the different parts to be heated. When using more than one transformer we prefer to place in series with the primary current a choking coil or regulator.

The transformer or transformers are fixed beneath the wheel (or other work) with the secondary coil or coils terminating at the contacts I and J through the star shaped poles G and H. The wheel C (a portion of which is shown in Fig. 4) is placed upon the central supporting pin K.

The glut pieces C^{11} (which are forged to the width of the wheel to be welded) are then placed between the die pieces $b\ b^1$ as shown in Fig. 4 water is then admitted through the pipes T t to the back of the cylinders A and the rams B forced outwards by which movement the glut pieces C^{11} are carried forward by the contact blocks M and held against the spokes of the wheel at the same time the contact arms L (as shown in Figs. 2 and 3) are drawn against the inner face of wheel C thereby completing the secondary circuit through the metal.

The primary circuit of transformer is then closed and when the metal has been sufficiently heated the admission valve on pipe $T^1\ t^1$ is opened and water admitted into the centre of cylinder between the two rams this forces out the hollow ram B^1 which has fixed upon its end the two die pieces $b\ b^1$ (which slide through recesses in the contact block M) until they project over the glut piece and part of spokes heated forming a closed die around the weld the admission valve on pipe T^1 is then closed allowing the full pressure (available) on the contact block M fixed on the end of ram B thereby completing the weld.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed we declare that what we claim is :—

1. An apparatus for heating and welding metals constructed with one or more electro transformers or generators the poles of which terminate in castings of star or other shape forming slides upon which carriages fitted with contacts move to and fro upon which the articles are placed so that the current passes through the article at the point desired to be heated in combination with a number of hydraulic cylinders and rams capable of being adjusted to the requisite position and of applying the desired amount of pressure to weld the metal whilst maintained at the desired temperature substantially as described.

2. In apparatus for heating and welding metals the combination with one or more transformers constructed with terminals in the form of slides in contact with the poles of the secondary circuit and a number of hydraulic cylinders and rams by which the contact pieces are brought into contact with the work and by which the necessary pressure is applied to make a weld substantially as described.

3. Apparatus for heating and welding metals constructed with the several parts arranged in combination substantially as described and shown.

Dated this 26th day of April 1895.

WM. P. THOMPSON & Co.,
Manchester, Liverpool, and London, Patent Agents.

London : Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1895

A.D. 1894. JULY 28. N° 14,536
PARKINSON & another's COMPLETE SPECIFICATION.

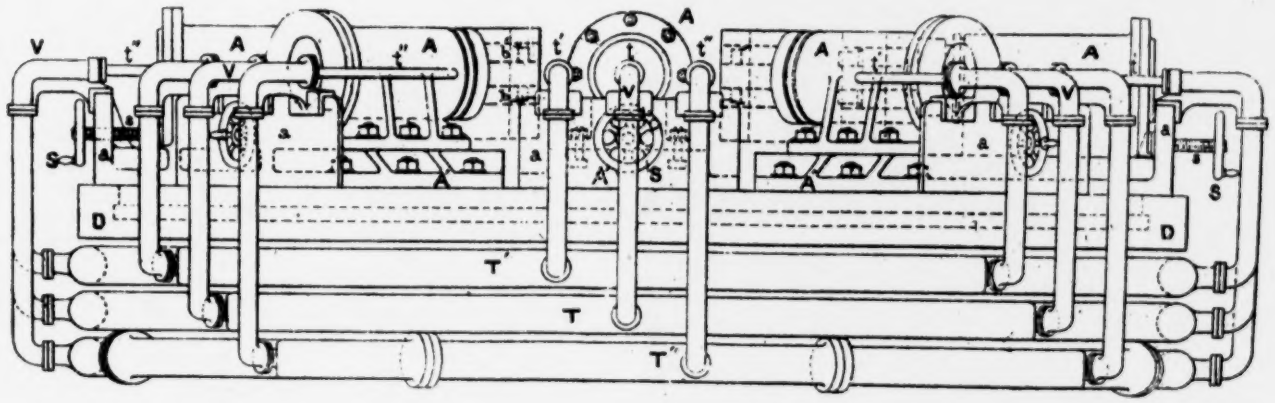


FIG. 1.

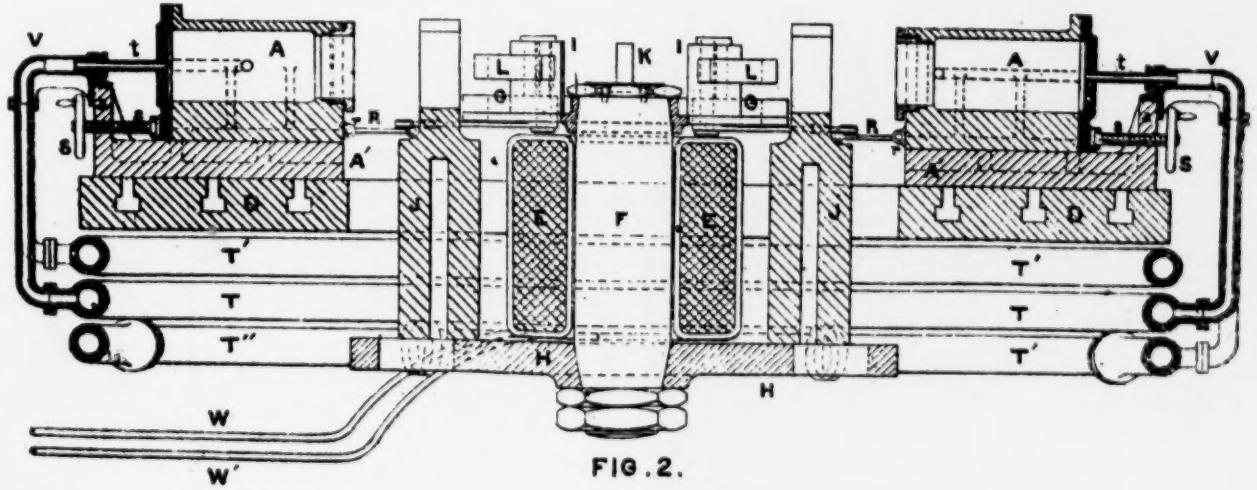
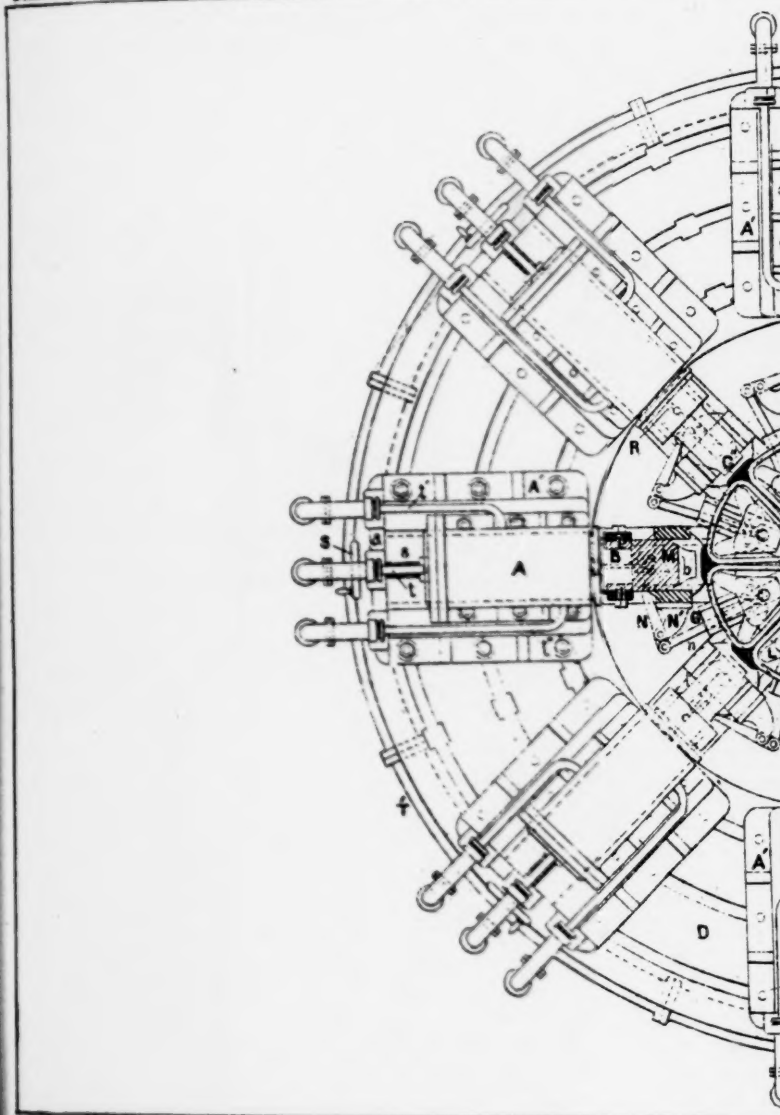


FIG. 2.

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A
A
A
A
B
b
R
N
N
D

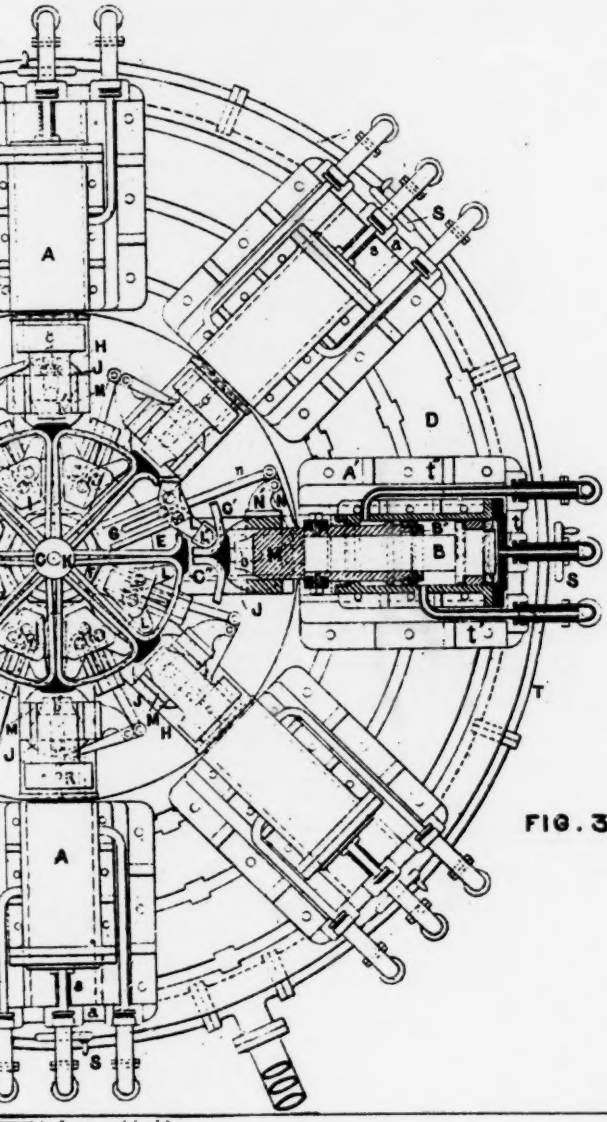


FIG. 3

Reduced from the original on a reduced scale.

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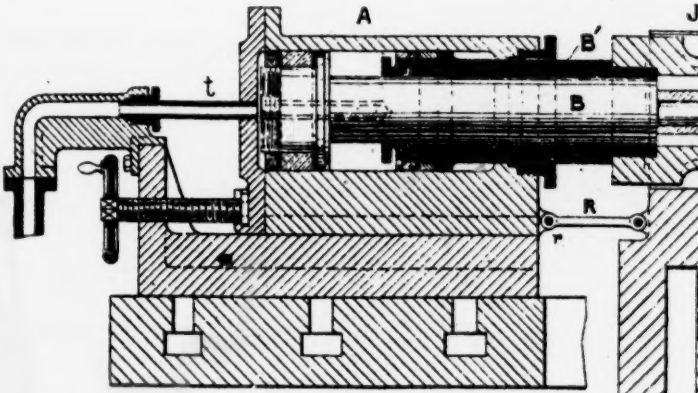


FIG. 4.

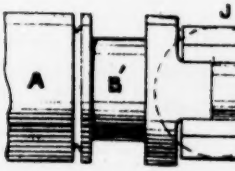


FIG. 6.

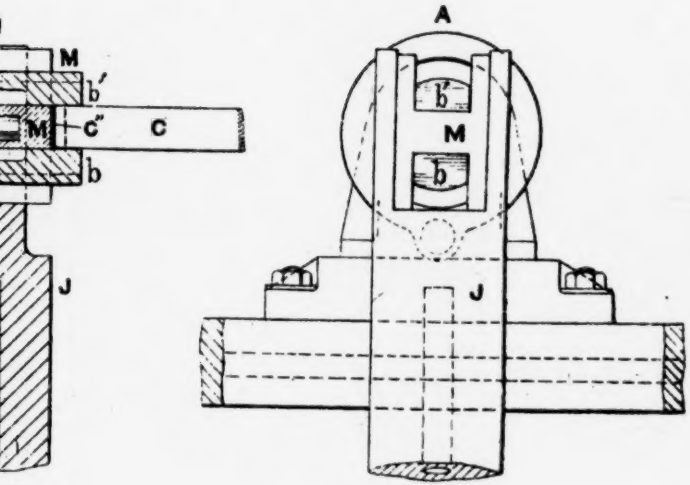


FIG. 5.



...ssary is an infringement of the Copyright in the Drawings.

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Wolfe & Sons, Photo-Litho.

Defendant's Exhibit No. 21.

No 21

S—300.

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the Complete Specification and Drawing in the matter of the

British Letters Patent to

Sebastian Ziani de Ferranti,

ed May 25, 1903, Number 11,921,

for

Improvements in and relating to the Electric Welding of T ne Blades.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 24th day of March, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

J McClay

Acting Commissioner of Patents.

S—300

1119

N° 11,921.—A.D. 1903.

Improvements in and relating to the Electric Welding of Turbine Blades.



ate "stepped" with regard to each other, the intervening projections of metal thus following the shape of the turbine blades to be welded to them.

Dated this 25th day of May 1903.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.
15, Temple Street, Birmingham, and
50, Cross Street, Manchester,
Agents.

COMPLETE SPECIFICATION.

"Improvements in and relating to the Electric Welding of Turbine Blades."

I, SEBASTIAN ZIANI DE FERRANTI, Engineer, of 31, Lyndhurst Road, Hampstead, London, N.W., do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The invention relates to improvements in and relating to methods of electrically welding turbine blades to the discs, drums or the like carrying them and has for its object to overcome the difficulties which have been experienced in electrically welding together two such parts differing considerably as regards their power of rising to the required welding temperature when heated at the point of junction, so that blade carrying elements with welded blades may be reliably produced in an inexpensive manner.

The main difficulty arises through the blades and their carriers differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the carrier to which it is to be secured, it is found that the comparatively large volume of metal forming the carrier rapidly conducts heat away from the welding point, thus preventing the temperature of the carrier rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of the blade carrying element in the neighbourhood of the welding point, so that approximately equal heating occurs in both faces to be welded.

Referring to the accompanying drawings which, with the exception of Figure 4, show the invention applied, by way of example, to a type of parallel flow turbine in which the blades are mounted on the edge of a wheel-like body.

Figure 1 is a part side elevation of such a wheel having cross grooves,

Figure 1ª being an edge view;

Figure 2 shows a similar edge view of a modification in which sets of intersecting grooves are adopted;

Figure 3 shows an edge view of a form having circumferential grooves,

Figure 3ª being a section on the line A A of Figure 3;

Figure 4 shows, in longitudinal sectional elevation, part of a drum carrier to which the blades are welded in accordance with one form of the invention;

Figures 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disc, while

Figure 7 is a part side elevation in which holes are bored through from face to face of the disc;

Figure 8 shows a sectional plan of a form of wheel built up of two dished discs, held apart at their circumferential portions by distance pieces.

1120

Figure 8ª being a scrap edge view to a larger scale;

Figure 9 is a similar sectional plan of a modified form of wheel built up of three discs, while

Figure 9ª is a corresponding scrap edge view also to a larger scale;

Figure 10 shows a part sectional elevation of a wheel built up of two comparatively thick discs having notched edges,

Figure 10ª being a scrap edge view, while finally

Figure 11 shows an edge view of a form of wheel built up of a series of "stepped" laminæ.

It will be seen that all the edge views are shown as developments for clearness of drawing and not as true projections.

The same reference symbols are, when possible, used in the accompanying drawings to denote similar parts.

In carrying out the invention according to the form shown in Figures 1 and 1ª, the turbine wheel or disc is shown at *a*, cross grooves, *b*, being cut in its circumferential edge so as to leave projecting portions of metal, *c*, to which the turbine blades, *d*, are welded.

The same object is attained by cutting two intersecting sets of grooves, *e*, in the edge of the disc, as is shown in Figure 2, or by cutting circumferential grooves, such as *f*, completely round the edge (see Figures 3 and 3ª.)

Figure 4 shows the invention, according to one form, applied to the case of a drum blade carrier, a^1; the drum is grooved circumferentially with grooves, f^1, the intervening collars of metal being then cross-cut to form projecting teeth, c^1, on which the blades are welded.

According to a modified form, radial holes, *h*, may be bored a short distance into the edge of the disc, these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in Figure 5, or arranged without particular reference to the position of the blades, (see Figure 6).

In Figure 7, a method is shown of removing metal in the neighbourhood of the welding point by boring holes, *i*, through (or partly through) from face to face of the disc at a radius slightly less than that of its outside edge.

The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, whilst at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint.

Referring now to Figures 8 and 8ª, a form of wheel is shown somewhat diagrammatically which is built up of two dished discs, *k*, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces such as *l*, disposed at a radius somewhat less than the maximum radius of the discs, the blades, *d*, being welded in position on their outside edges.

Figures 9 and 9ª show a type of wheel generally similar to that last described but having an intermediate plane disc, *m*, in addition to the two dished discs, *k*: a portion, *n*, of the hub, *o*, is in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, *l*, are indicated as before but any other convenient method of holding the discs in their correct relative position may be adopted.

In Figures 8 and 9, the dished discs, *k*, are indicated as secured to the hubs, *o*, by pressing the inner edges of these discs into grooves and subsequently [illegible] over the hubs to hold the discs in place.

In the modification shown in Figures 10 and 10ª two dished discs, *k*, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, *b*, being cut in their edges in accordance with the method described above with reference to Figures 1 and 1ª.

Again, that portion of the disc carrying the blades, may be built up of a set of thin laminæ, *r*, (see Figure 11) the edges of which are notched as at *s*, the laminæ being assembled in such a way that the notches, *s*, are "stepped"

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22

with regard to each other, so that the intervening projections of metal may follow the shape of the turbine blades to be welded to them.

Instead of notching the laminae, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

In an invention such as the present, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the scope is sufficiently indicated by the many examples given above, and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described above by way of example.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In turbines, the method of welding the turbine blades to the element carrying them, consisting in so adjusting the volume of metal in the blade carrier in the neighbourhood of the welding point, that approximately equal heating occurs in the two parts, substantially as described.

2. In turbines, blade carrying elements having blades welded thereupon in accordance with the method claimed in Claim 1.

3. In turbines, grooving the blade carrier in the neighbourhood of the welding point, substantially as and for the purpose described.

4. The bladed turbine element, hereinbefore described with reference to Figures 1 and 1ª of the accompanying drawings.

5. The bladed turbine element, hereinbefore described with reference to Figure 2 of the accompanying drawings.

6. The bladed turbine element, hereinbefore described with reference to Figures 3 and 3ª of the accompanying drawings.

7. The bladed turbine element, hereinbefore described with reference to Figure 4 of the accompanying drawings.

8. In turbines, forming holes in the blade carrier in the neighbourhood of the welding point, substantially as and for the purpose described.

9. The bladed turbine elements hereinbefore described with reference to Figures 5 and 6 of the accompanying drawings.

10. The bladed turbine element, hereinbefore described with reference to Figure 7 of the accompanying drawings.

11. In turbines, building the blade carriers of comparatively thin parts across the non-touching edges of which the blades are welded, substantially as described.

12. The bladed turbine element, hereinbefore described with reference to Figures 8 and 8ª of the accompanying drawings.

13. The bladed turbine element, hereinbefore described with reference to Figures 9 and 9ª of the accompanying drawings.

14. The bladed turbine element, hereinbefore described with reference to Figures 10 and 10ª of the accompanying drawings.

15. In turbines, building the blade carriers of prepared laminae assembled in a "stepped" manner, substantially as and for the purpose hereinbefore described.

16. The bladed turbine element, hereinbefore described with reference to Figure 11 of the accompanying drawings.

Dated this 24th day of February, 1904.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.
13, Temple Street, Birmingham, and
30, Cross Street Manchester.
Agents.

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[G. 3719 60—7/1905.]



Fig. 1.



Fig. 2.

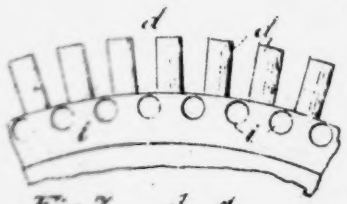


Fig. 7.

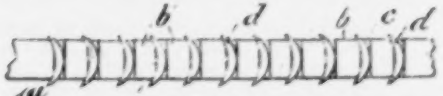


Fig. 1a.



Fig. 3.

Fig. 5.

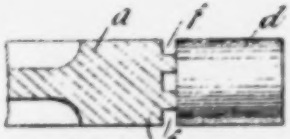


Fig. 3a

Fig. 6.

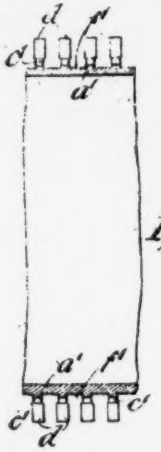


Fig. 4.

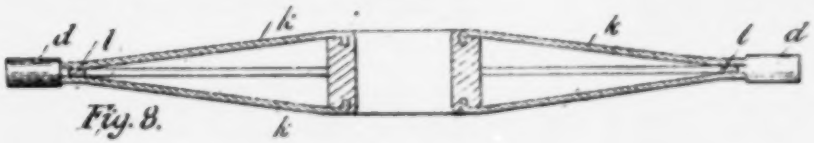


Fig. 8.

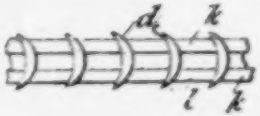


Fig. 8a

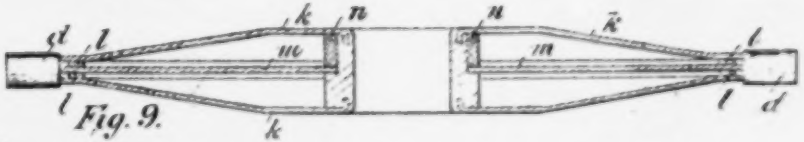


Fig. 9.

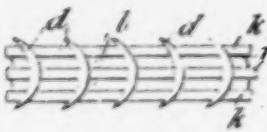


Fig. 9a



Fig. 11.



Fig. 10.

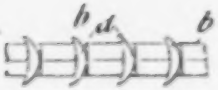


Fig. 10a.

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11233

N° 22,981 A.D. 1903

Date of Application, 23rd Oct., 1903
Complete Specification Left, 25th July, 1904—Accepted, 25th Aug., 1904

OCT 1 1904
U.S. PATENT OFFICE

PROVISIONAL SPECIFICATION.

"Improvements in Welding by Electricity and Apparatus therefor".

I, JOHANN HARMATTA, of Kirchdrauf, in the Kingdom of Hungary, Engineer, do hereby declare the nature of this invention to be as follows:—

This invention relates to the production, by direct electric welding, of metal articles of all kinds, especially such as are made of thin sheet metal.

According to the invention one or both of the electrodes is or are not only utilized for supplying the electric current, but also for exerting pressure at the point at which the welding to be effected, before and during the supply of electric current or only during the time of flow. To this end the part which supplies the electricity serves simultaneously as the means for effecting the mechanical operation, this arrangement giving rise to the most favourable results as regards the operation, since, as is well known, in every efficient method of welding, the parts to be joined after being brought to the proper temperature must be immediately hammered or subjected to compression in order to obtain a good joint.

In no one of the known electric welding processes, are the parts to be welded, during the operation of welding, pressed against one another by means of one or both of the electrodes in order to assist the welding operation. Hitherto either no pressure at all has been made use of or pressure when used has been applied at some distance from the welding point or not upon centred electrodes pressing directly upon the parts to be heated. To sum up, in direct electric welding, pressure has never heretofore been applied by means of electrodes placed in the direction of flow of current directly over the surfaces or points to be welded.

The process forming the subject of this invention can be carried out in a number of ways, as the necessary pressure at the welding point can be obtained by any suitable known means for generating or transmitting pressure, for example, by means of a press, either directly or through the medium of lever transmission. Or, the pressure can be obtained by employing a hand lever by direct or indirect manual operation.

In carrying out the invention the metal parts (sheets or the like) the ends of which overlap are passed between the two electrodes, one of which is caused to exert pressure upon the parts to be welded either before the welding operation or during the said operation; or both the electrodes can be utilized for obtaining the required pressure. This may advantageously be done, particularly in cases where it is required to continuously weld longitudinal, transverse and circular joints, by providing in intimate contact with each of the conductors, a fork furnished with an easily exchangeable roller electrode; or only the lower of the two roller electrodes can be made exchangeable. Furthermore, only the upper or lower electrode need be in the form of a movable roller, the other electrode being the fixed contact conductor.

The roller of the upper conductor is keyed upon a spindle which carries a toothed pinion to which the motion of a suitably mounted hand wheel can be transmitted through the medium of a gear wheel; or the hand wheel can be directly mounted upon the spindle which it can thus drive without intermediate

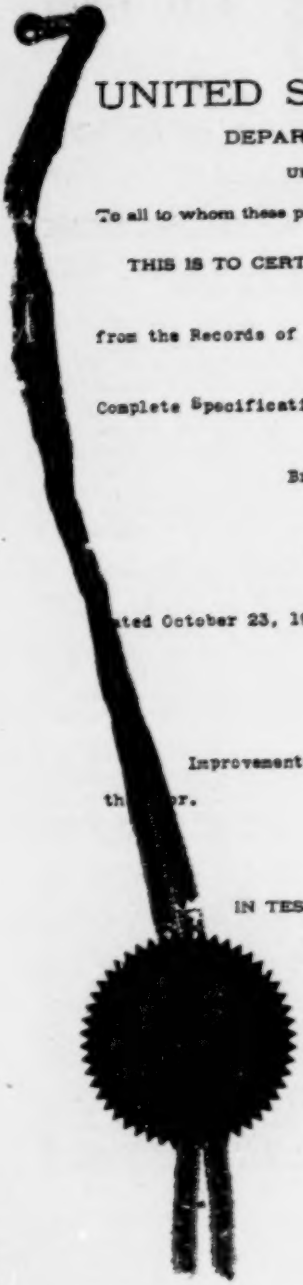
[*Price 8d.*]

CLOSE IN CENTER

11:24

Defendant's Exhibit No. 22.

No 22



UNITED STATES OF AMERICA

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a photographic co

from the Records of this Office of the Provisional Specificat

Complete Specification and Drawing, in the matter of the

British Letters Patent to

Johann Harmatta,

ted October 23, 1903, Number 22,981,

for

Improvements in Welding by Electricity and Apparatus

th r.

IN TESTIMONY WHEREOF I have hereunto set my h

and caused the seal of the Patent Office to be aff

at the City of Washington, this 14th

of September , in the year of our Lord

thousand nine hundred and seventeen an

the Independence of the United States of Americ

one hundred and forty-second.

R. F. Whit

Acting Commissioner of Pat

gear. Furthermore, the spindle can have mounted upon its other end a pinion, bevel wheel driving disc or the like for mechanically driving the roller electrode where the automatic feeding of the parts to be welded by motive power is desired. The hand wheel is designed to increase or retard the rotation of the roller according to requirement, or to operate the said roller directly by hand. The retardation or acceleration of the motion of the spindle with a power drive can obviously be effected by other suitable means. The upper part of the forked piece carrying the roller electrode can be in the form of a rack with which engages a pinion carried by the conductor through the medium of a clamp, the said pinion being keyed upon a spindle which at its other end is provided with a hand lever. By raising or lowering the said hand lever the upper roller electrode can obviously be moved from, or approached towards, the lower electrode. Furthermore, by raising or lowering the forked piece of the lower conductor the lower exchangeable roller can be adjusted in position.

If, now, the materials to be welded be introduced between the two roller electrodes and current caused to flow, a continuous welding can be obtained, that is to say, an unbroken joint can be made, the upper rotating roller electrode pressing upon the lower fixed or rotatable roller electrode so that the two ends of the work to be welded are rigidly connected together.

Instead of gradually feeding the parts to be welded between the electrodes the electrical welding apparatus can be made to move relatively with the work, in this case fixed in position.

In cases where it is desired to weld metal sheets at single points only I advantageously make use of apparatus wherein the electrodes are in the form of rods or pins. The lower electrode is fitted in the lower conductor, whilst the upper electrode is carried by a yoke adapted to be turned around a spindle or axis by a hand lever in such a manner that the points of the electrodes can be approached towards, or moved away from, one another. If now, for example, two overlapping sheet metal ends to be welded are introduced between the electrodes, and the latter pressed towards one another and current allowed to flow, then a small, round and clean welding point is obtained which fully takes the place of a rivet. The pressure at the welding point at suitable intervals can be exactly regulated, that is to say, kept within proper limits, particularly in the case of welding thin vessels which cannot sustain any considerable pressure.

Dated the 20th day of October 1903.

G. F. REDFERN & Co.,
4, South Street, Finsbury, London
Agents for the Applicant.

COMPLETE SPECIFICATION.

"Improvements in Welding by Electricity and Apparatus therefor"

I, JOHANN HARMATTA, of Kirchdrauf, in the Kingdom of Hungary, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to a method of electrically welding thin metal sheets of a thickness of about two millimeters.

It is well known that it is not possible, with electric welding processes

heretofore in vogue, to make a sound welding joint between sheets of such small thickness as above mentioned that is to say, a joint which is completely tight throughout, without igniting and burning the material to be welded.

The inventor has found that this is due to the following facts. In the known methods of welding it is usual to convey current to the articles to be welded (for example, iron rods, tyres, chains, links or the like) whereby the layer of air of more or less thickness, which is always present between the two objects to be welded, gives rise to an energetic formation of sparks, that is to say, a sparking area or an arc, this continuing until the bodies to be welded are brought to the welding heat by the current, when they are pressed together for effecting their union.

This known method of welding does not differ essentially from the ordinary welding by fire heat, except that the bodies to be welded are heated by the electric current instead of by the gases of combustion derived from a suitable combustible material; as soon as the necessary temperature is attained, however, the final jointing of the bodies is in both cases effected by mechanical pressure, such as pressing or hammering.

In the diagrammatic view shewn in Figure 1 of the accompanying drawing, and in which it is assumed that two sheets 1 and 2 are to be welded by the ordinary method of electric welding, two electrodes *a* and *b* are placed opposite one another. The two metal sheets 1 and 2 are placed between the two electrodes and lie loosely upon one another (that is to say, they are not mechanically or otherwise pressed together) and are consequently separated by a layer of air 3. If, now, the circuit containing the electrodes *a* and *b* and the two sheets be closed and the air layer 3 is of sufficient thickness, that is to say, the resistance of the air sufficiently great, no sparks or arcs are initially formed between the sheets. When, however, the sheets are approached towards one another, which is unavoidable for the final welding by pressure, hammering, *etc.*, as above mentioned, then a point is reached at which the air resistance between the two sheets to be welded is no longer sufficiently great to prevent the passage of electricity, whereby arcing or sparking takes place between the sheets and continues until an intimate contact between the two sheets takes place. When relatively thick sheets (as is shewn in Figure 1) are treated in this manner the formation of the arcs is not injurious, since the small fusions 4, which are occasioned by the arcs or sparks, are not of sufficient depth to perforate or break through the thickness of the material. On the contrary an advantage is obtained as the sparks or arcs effect an alteration in the cross sectional area of the material thinning the same at the joint, that is to say, reducing the total cross sectional areas at the joint to an extent such that, in certain circumstances, the resulting total thickness is equal to that of one of the sheets.

The conditions, however are quite different when welding thin bodies, or a thin body and a thicker body as is diagrammatically indicated in Figure 2 of the accompanying drawing. In this figure, it is assumed that the thicker sheet 2 which under the conditions given in Figure 1 is not perforated by the fusion shewn at 4, is to be electrically welded to a thin sheet 5. In carrying out the process, when the two sheets 2 and 5 are approached towards one another at the required moment, as above described, the sparking through the air layer 3 causes the fusion of the metal sheets, the fusion taking place to a depth which is of no consequence in the sheet 2, but which in the case of the sheet 5 is sufficient to completely perforate and burn it. The usual method of welding, therefore, is not practicable in the case of such thin sheets as that illustrated at 5, Figure 2, that is to say, a sheet of a thickness of 2 millimeters and under.

The novel method of electric welding forming the subject of this invention is characterised chiefly by the fact that it prevents the formation of such injurious arcing or sparking during the welding of thin bodies, thereby enabling

such bodies to be connected together by a perfectly sound weld, and also permitting of the sound welding of a thin body and a thicker body.

To prevent the formation of the injurious arcing or sparking according to this invention, I exert upon the superposed metal plates 4 and 5 (Figures 4 and 5) a pressure which varies in accordance with the articles to be welded, this pressure being exerted by the electrodes *a*, *b*, and being supplemented, *if desired* by that obtained by other means hereafter to be described. This pressure has for its object to bring the metal parts to be joined into such intimate contact that the layer of air existing between them is destroyed as far as possible. The two parts to be welded are by this means formed so as to say to a single body mechanically. This is of particular importance when two very thin sheets are to be welded together, for, as is well known, thin sheets always possess a more or less wavy form, and cannot be manufactured with as level surfaces as is the case with thicker sheets. Such sheets, therefore, when they are superposed without mechanical pressure do not lie closely upon one another, but by reason of their irregular wavy shape form a number of air spaces (Figure 3), which, when an electric current is passed through them, are very favorable to the formation of sparks and arcs.

After the metal articles to be welded are treated in the manner above described, that is to say, tightly pressed together by mechanical pressure so as to prevent the existence of air air layer between them, the electric circuit is closed, whilst the surface pressure is maintained.

At those points at which the electrodes *a*, *b* exert their pressure (Figures 4 and 5), that is to say, at which the current can flow through the two bodies to be welded without having to perforate an air layer and form sparks, the metal is heated up to the welding heat. As soon as this heat is obtained, the continuous pressure effects the desired union, that is to say, the welding of the two metal bodies 5 and 6, without the occurrence of damage arising from the perforation, burning, *etc.* of the bodies, even should these be composed of very thin material. It is furthermore to be noted that the pressure which is exerted upon the bodies to be welded, both anterior to, and during, the welding operation, and which pressure can be regulated to suit the character of the metal bodies, is adjusted in accordance with the actual thickness of the sheets. Thicker sheets or bodies do not require so great a pressure as thinner sheets, since, as above mentioned, they possess a more even regular surface, and when superposed can easily be closed so as to prevent the existence of injurious air layers. As the essential requirement is that the metal bodies to be united shall be tightly pressed together before welding, in order to prevent the perforation of the thin body by the electric current, it will be clear that the process is applicable not only to sheets of equal thicknesses, but also to the welding of a thin sheet and a thicker metal article without the liability of the burning of the former.

It will be obvious that the pressure can be exerted either by one of the electrodes only or by both the electrodes.

For carrying out the process when it is applied to the continuous welding of longitudinal, transverse and edge joints, the device illustrated in Figures 6 and 7 of the accompanying drawing can be used. Figure 6 indicates a front view of the device, and Figure 7 a sectional side view thereof.

Between the two current conductors *c*, *d* (Fig. 7) and in intimate contact therewith, are arranged forks *e*, *f*, each of which is furnished with an easily exchangeable roller-electrode *g* or *h*; or only the lower of the two electrodes may be made exchangeable. Furthermore, only the lower or the upper electrode need be in the form of a movable roller, the other electrode being the fixed current conductor. The roller *g* of the upper conductor *c* is keyed upon a spindle *i*, which carries a toothed pinion, to which the motion of a suitably mounted hand-wheel *l* can be transmitted through the medium of a gear wheel *m*, or the hand-wheel can be directly mounted upon

the spindle, that is to say, can be directly driven from the spindle *i*. Furthermore the spindle *i* can have mounted upon its other end a pinion, bevel wheel, driving disc or the like for mechanically driving the roller-electrode where the automatic feeding of the parts to be welded by motive power is desired. The hand-wheel is designed to increase or retard the rotation of the roller *g* according to requirement, or to operate the said roller directly by hand. The retardation or acceleration of the motion of the spindle *i* with a power drive can obviously be effected by other suitable means. The upper part of the fork carrying the roller-electrode *g* can be in the form of a rack *n* as shown, the said rack engaging a pinion *p* carried by the conductor *e* through the medium of a clamp *o*, and keyed upon a spindle *q* having a hand lever *r*. By raising or lowering the hand lever *r* the upper roller-electrode *g* can be moved from, or approached towards, the lower electrode *h*. Furthermore, by raising or lowering the fork *f* in the conductor *d* the lower exchangeable roller *h* can be adjusted in position.

If, now, the materials to be welded be introduced between the two roller electrodes and current caused to flow, whilst the pressure is maintained, a continuous welding can be obtained, that is to say, an unbroken sound joint can be made, even in the case of thin sheets.

Instead of gradually feeding the parts to be welded between the electrodes the electrical welding apparatus can be made to move relatively with the work, in this case fixed in position.

In cases where it is desired to weld metal sheets at single points only I advantageously make use of apparatus wherein the electrodes are in the form of rods or pins. Such an arrangement is shown in side elevation in Figure 8. *a* and *b* represent the pin electrodes, the lower *b* being fitted in the conductor *d* whilst the upper *a* is carried by a yoke *s* adapted to be turned around a spindle or axis *u* by a hand-lever *t* in such a manner that the points of the electrodes can be approached towards, or moved away from, one another. If now, for example, two overlapping sheet metal ends to be welded be introduced between the electrodes *a*, *b*, and the latter pressed towards one another and current allowed to flow, then a small, round and clean welding point is obtained which fully takes the place of a rivet. The pressure at the welding point at suitable intervals can be exactly regulated, that is to say, kept within proper limits, particularly in the case of welding thin vessels which cannot sustain any considerable pressure.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A method of electrically welding thin metal sheets or thin and thick sheets or bodies, wherein the said sheets are superposed and subjected to pressure at the point to be welded, the pressure being maintained during the subsequent heating of the sheets or bodies by an electric current, substantially as and for the purpose hereinbefore described.

2. In electrically welding thin sheets and bodies, the arrangement wherein pressure is exerted upon the bodies at the points to be welded both before and during the passage of the electric current by means of oppositely placed pin electrodes controlled by a lever or the like, substantially as hereinbefore described.

3. In electrically welding thin sheets and bodies, the arrangement wherein pressure is exerted upon the bodies, both before and during the passage of the electric current, by oppositely placed electrodes, one of which is in the form of a movable roller and the other of a fixed current conductor adapted to receive the bodies to be welded, or both of which are in the form of roller-electrodes, one or both of which is or are actuated to effect the automatic feed

of the work whilst maintaining the necessary pressure, substantially as herein-before described.

4. Apparatus for electrically welding thin bodies or thin and thick bodies constructed substantially as hereinbefore described and illustrated in the accompanying drawings.

Dated this 25th day of July, 1904.

G. F. REDFERN & Co.
4, South Street, Finsbury, London
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1904.

SHEET 1

Fig. 1.

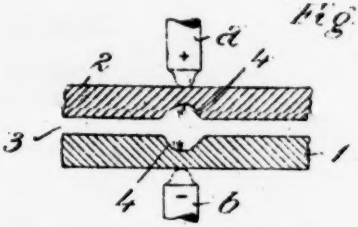


Fig. 2.

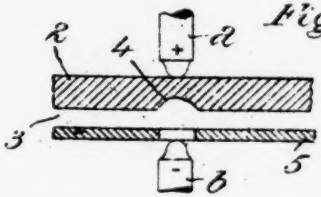


Fig. 3.

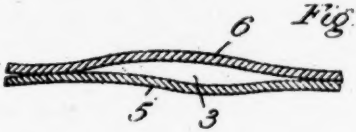


Fig. 4.

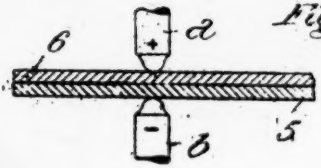


Fig. 5



Fig. 6.

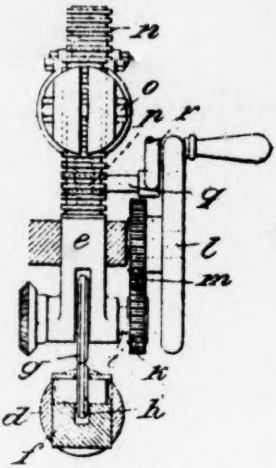
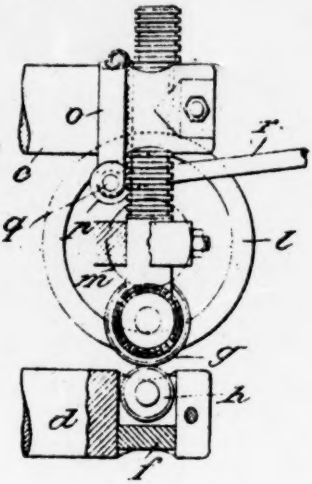


Fig. 7.



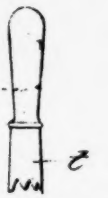
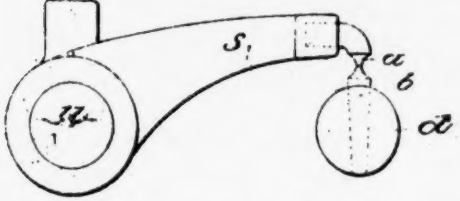


Fig. 8.



1131

Defendant's Exhibit No. 23.

2—200. No. 23

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the Specification and Drawing, in the matter of the

French Letters Patent to

EGEL,

Dated October 13. 1903 Number 335,889,

Procede et dispositif pour la fabrication d'objets metalliques de tous genres, principalement d'objets composes de parties minces, d'epaisseurs differentes, par soudage electrique direct.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 24th day of March, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Thos. Ewing Clay

Acting Commissioner of Patents.

RÉPUBLIQUE FRANÇAISE.

OFFICE NATIONAL DE LA PROPRIÉTÉ INDUSTRIELLE.

BREVET D'INVENTION

du 13 octobre 1903.

VIII. — Mines et métallurgie.

3. — Métaux autres que le fer.

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N° 335.889

Brevet de quinze ans demandé le 13 octobre 1903, par **M. Wilhelm EGEL** résidant en Allemagne.

Procédé et dispositif pour la fabrication d'objets métalliques de tous genres, principalement d'objets composés de parties minces, d'épaisseurs différentes, par soudage électrique direct.

Délivré le 21 décembre 1903; publié le 18 février 1904.

La présente invention a pour objet un procédé pour la fabrication d'objets métalliques de tous genres, particulièrement aussi de ceux qui se composent de parties d'épaisseurs différentes, par soudage électrique direct. Le nouveau procédé consiste en ce que l'électrode qui s'applique contre le corps métallique qui a la plus grande épaisseur est soumise pour une tension relativement faible à une quantité de courant plus grande par unité de temps que l'électrode qui s'applique contre le corps métallique (fer-blanc, etc.) d'une épaisseur moindre. Un calcul toujours exact des proportions de courant évite que le corps métallique le plus mince ne soit brûlé, c'est-à-dire détérioré.

On peut exécuter le procédé de différentes façons; cependant, on donne la préférence à un dispositif qui convient particulièrement pour le but. Ce dispositif est caractérisé en principe en ce qu'un des deux conducteurs appartenant au circuit secondaire d'un transformateur possède une section de passage réglable, afin de pouvoir amener, à l'un ou à l'autre des corps métalliques qu'il s'agit de souder, les différentes quantités de courant, selon les besoins actuels du travail.

Au dessin, la fig. 1 montre que pour le soudage de tôles, etc., d'épaisseurs différentes les deux électrodes sont alimentées par des courants d'intensités différentes et cette manière de disposer des électrodes a surtout pour but de remplacer sur les objets traités certaines rivures par des soudures électriques.

La fig. 2 est une vue schématique d'un dispositif qui peut être employé avantageusement pour l'exécution du procédé, surtout lorsqu'il s'agit d'un soudage progressif continu de sutures longitudinales, transversales et circulaires, pour des récipients en fer-blanc et objets métalliques de tous genres.

Les fig. 3 et 4 représentent en élévation de face et en élévation de côté une exécution pratique des conducteurs qui amènent le courant aux électrodes.

Bien que pour des sections métalliques différentes plus grandes, la circonstance que, dans les machines à souder existantes, les deux pôles ne fournissent que la même quantité d'électricité de la même tension, ne soit pas aussi grave, le cas est tout à fait différent lorsqu'il s'agit de souder des objets de la matière la plus mince avec d'autres d'une épaisseur considérablement supérieure, comme cela a lieu, par exemple, lorsqu'il s'agit de souder du fil métallique ou de la tôle, avant,

par exemple, 4 millimètres d'épaisseur, sur du fer-blanc n'ayant que 0,3 millimètres d'épaisseur. Si on amenait des quantités de courant égales, le fer-blanc de 0,3 millimètres serait brûlé depuis longtemps, avant que le fil métallique de 4 millimètres soit seulement devenu rouge.

Suivant le présent procédé, on supprime cet inconvénient en amenant, à une tension égale des quantités de courants différentes par unité de temps, par exemple, comme le montre la fig. 1, pour une électrode *a* 1.000 et pour l'autre *b* 3.000 ampères, avec une tension de 0,3 - 4 volts. Il serait possible d'employer dans ce but deux circuits qui amèneraient aux endroits voulus une quantité différente d'ampères. Pour les applications pratiques cependant il convient d'employer un seul circuit et des essais en ce sens ont démontré que pour cela le circuit secondaire d'un transformateur qui réduit la tension à une faible quantité de volts, convient spécialement.

A la fig. 2, *c* désigne l'enroulement primaire et *d* l'enroulement secondaire d'un transformateur.

L'un des conducteurs, *e f* (ou bien les deux) ne constitue pas, en un certain endroit, une pièce pleine, mais est interrompu en cet endroit, et entre les deux extrémités du conducteur sont intercalées des lamelles métalliques parallèles *g*, de préférence en cuivre, dont la section totale est exactement égale à la section du conducteur proprement dit. On peut, selon les exigences actuelles du travail, enlever un nombre plus ou moins grand de ces lamelles pour réduire ainsi la section du conducteur, c'est-à-dire pour déterminer le passage d'une quantité d'électricité, par unité de temps, exactement fixée d'avance. Comme de cette façon on réduit, selon les besoins, l'arrivée de courant à l'une ou à l'autre des électrodes, on peut amener en même temps au blanc-soudant les deux sections qu'il s'agit de souder l'une à l'autre. Par conséquent la possibilité de brûler le corps métallique le plus mince disparaît complètement; et pour prouver qu'un réglage de l'arrivée du courant est possible dans les limites les plus larges, on peut à titre démonstratif réussir à brûler d'abord la section la plus forte en cherchant à souder deux sections d'épaisseurs différentes.

Les essais faits ont démontré que des courants d'une si faible tension et d'une intensité relativement grande, sont très inertes, de sorte que l'équilibre de courant au point de soudure ne se produit pas tout de suite, de sorte qu'il est possible qu'il se produise une retenue de courant dans un des conducteurs.

Pour des applications pratiques on peut disposer l'arrangement pour régler le courant de la manière indiquée aux fig. 3 et 4.

La source de courant est reliée à deux supports *i* ayant une forme et une longueur correspondantes et dans ces supports sont disposés deux bons conducteurs électriques *e f* d'aussi peu de résistance que possible. Dans la forme d'exécution représentée aux fig. 3 et 4 le conducteur supérieur seul est muni d'un dispositif régulateur de courant. A cet effet, il est muni d'une rainure dans laquelle sont placées les extrémités de diverses barres *g* ou de lamelles, câbles, etc., de conductibilité également bonne, et convenables, ayant une section appropriée et présentant peu de résistance au passage du courant. L'autre extrémité de ces barres, plaques, etc., se trouve en contact intime dans une rainure de la même forme pratiquée dans l'extrémité de la source de courant *i*. Les extrémités des conducteurs *e f* qui sont éloignées de la source de courant, sont munies des électrodes *a b* qui de préférence ont la forme de galets; l'une des électrodes peut être pressée au moyen d'un levier ou autre dispositif analogue, vers l'autre, ou bien les deux électrodes peuvent être pressées également l'une vers l'autre.

Lorsque l'admission du courant aux deux électrodes doit être changée, on enlève, selon le besoin, un nombre plus ou moins grand des barres, plaques ou lamelles *g* du conducteur qui est destiné à fournir le courant plus faible (dans le cas représenté le conducteur supérieur) de façon à augmenter sa résistance, de sorte qu'une quantité moindre de courant passe par le conducteur respectif à l'électrode.

Naturellement on peut aussi produire le réglage de la quantité de courant, aux endroits de la soudure qui exigent moins de courant, au moyen d'autres dispositifs quelconques qui réduisent ou augmentent le passage du courant.

L'opération, lorsqu'il s'agit de souder des

corps métalliques d'épaisseurs différentes, est la suivante :

On dispose les parties en tôle, ou autres qu'il s'agit de souder les unes au-dessus ou à côté des autres, après quoi on serre les électrodes (à galet ou autres) et on ferme le circuit primaire. Le courant secondaire formé par suite de cette fermeture du circuit par le transformateur passe par le conducteur à section variable aux électrodes et de là dans la matière qu'il s'agit de souder, et ce circuit secondaire est achevé par la section qu'il s'agit de souder, c'est-à-dire au point de soudure.

RÉSUMÉ :

1° Un procédé pour fabriquer des objets métalliques de tous genres, et particulièrement des objets composés de parties relativement minces, d'épaisseurs différentes, par soudage électrique direct, caractérisé en ce qu'à l'électrode qui s'applique contre le corps métallique de section plus grande (fer-blanc, etc.), on amène, avec la même tension, une quantité de courant plus grande par unité de temps qu'à l'électrode appliquée contre le corps métallique fer-blanc ou autre de section moindre.

2° L'admission du courant aux électrodes a lieu au moyen de deux conducteurs appartenant au circuit secondaire d'un transformateur et possédant une résistance faible, et dont l'un, ou éventuellement les deux, ont une section réglable suivant les besoins, afin de pouvoir amener des quantités de courants différentes à l'un ou à l'autre des corps métalliques qu'il s'agit de souder et qui ont des sections différentes.

3° Dans le circuit de l'un des conducteurs sont intercalées des lamelles métalliques, de préférence en cuivre, facilement détachables et portées par des sabots convenables et dont le nombre, variable suivant les besoins du travail, détermine la quantité de courant passant par unité de temps.

W. EGEL.

Par procuration :

E. BELIN.

IMPRIMERIE NATIONALE. — Pour la vente, s'adresser à la Société BELIN et Cie, 56, rue des Francs-Bourgeois, Paris (3e).

N° 335 889 M. Egel Pl unique

Fig. 1

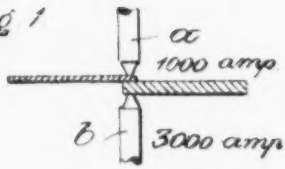


Fig. 2

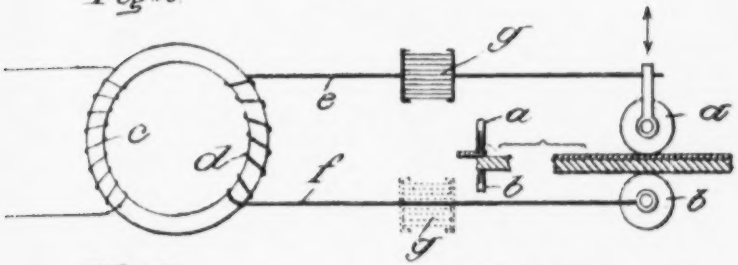


Fig. 3

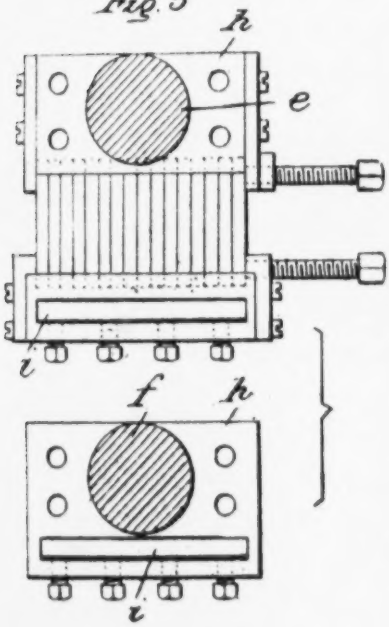
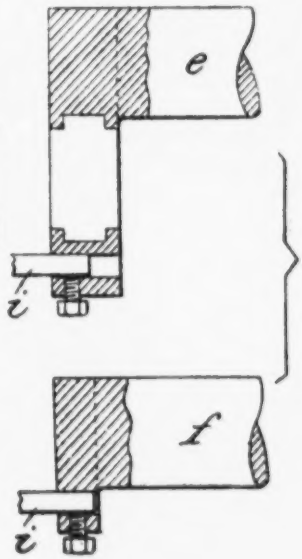


Fig. 4.



Defendant's Exhibit No. 24.

TRANSLATION.

FRENCH PATENT No. 335,889—WILHELM EGEL—*October* 13, 1903

Process and Means for the Manufacture of Metal Objects of All Kinds, Principally Objects Composed of Thin Parts, of Different Thicknesses, by Direct Electric Welding.

(DELIVERED DECEMBER 21, 1903; PUBLISHED FEBRUARY 18, 1904)

The present invention has for its object a process for the manufacture of metallic objects of all kinds, particularly those which comprise parts of different thicknesses, by direct electric welding. The new process consists in that the electrode, which is applied against the metallic body which has the greatest thickness, is subjected, for a relatively weak potential, to a greater quantity of current per unit of time than the electrode, which is applied against the metallic body (tin, etc.) of less thickness. An always exact calculation of the proportions of current prevents the thinner metallic body from being burned, that is to say, deteriorated.

The process may be carried out in different ways; however, preference is given to a means which is particularly suited for the object in view. This means is characterized, in principle, by the fact that one of the two conductors, belonging to the secondary circuit of a transformer, possesses a section of variable size, in order to be able to feed, to one or the other of the metallic bodies to be welded, the different quantities of current, according to the actual needs of the work.

In the drawing, Fig. 1 shows that for the welding of sheets, etc., of different thicknesses, the two electrodes are fed by currents of different intensities, and this manner of arranging the electrodes has especially for its object to substitute electric welds for rivets in the objects treated.

Fig. 2 is a diagrammatic view of a means which may be employed advantageously to carry out the process, especially when it relates to a progressive continuous welding of longitudinal, transverse and circular seams, for tin vessels and metallic objects of all kinds.

Figs. 3 and 4 represent in front elevation and in side elevation a practical embodiment of the conductors which feed the current to the electrodes.

Although for larger different metallic sections, the circumstances that, in existing welding machines, the two poles only furnish the same quantity of electricity at the same potential, is not of so much importance, the case is entirely different when it relates to welding objects of very thin material to others of a considerably greater thickness, as is the case, for example, when a metallic wire or sheet of, for instance, 4 millimeters thickness, is to be welded to sheet tin having only 0.3 millimeters of thickness. If equal quantities of current were fed, the sheet tin of 0.3 mms. would be burned

long before the metallic wire of 4 mms. was even heated to red heat.

According to the present process this difficulty is overcome by feeding, at equal potential, different quantities of current per unit of time, for example, as shown in Fig. 1, for one electrode a, 1,000 amperes, and for the other b, 3,000 amperes, with a potential of 0.5-4 volts. It would be possible to use for this purpose two circuits which would feed at the desired points a different quantity of amperes. For practical applications, however, it is sufficient to employ a single circuit, and experiments along this line have demonstrated that, for that, the secondary circuit of a transformer, which reduces the potential to a small quantity of volts, is particularly suitable.

In Fig. 2, *c* indicates the primary winding and *d* the secondary winding of a transformer.

One of the conductors *e f* (or else both of them) does not constitute, at a certain place, a solid piece, but is interrupted at that place, and between the two ends of the conductor are interposed parallel metallic plates *g*, preferably of copper, the total section of which is exactly equal to the section of the conductor proper. According to the actual exigencies of the work, a greater or less number of these plates may be removed, to thus reduce the section of the conductor, that is to say to permit the passage of a quantity of electricity, per unit of time, exactly determined in advance, as in this way, the arrival of current at one or the other of the electrodes is reduced, as needed, sections which are to be welded can be brought at the same time to white heat the two. In consequence, the possibility of burning the thinner metallic body disappears completely, and to prove that a regulation of the arrival of the current is possible within the widest limits, it is possible, by way of experiment, to burn first the thicker section in trying to weld two sections of different thicknesses.

The experiments made have shown that currents of such a low potential and of a relatively high intensity, are very inert, so that the equilibrium of the current at the point of the weld is not produced at once, whereby it is possible that there is produced a retention of the current in one of the conductors.

For practical applications the means for regulating the current may be arranged as shown in Figs. 3 and 4.

The source of current is connected to two supports *i*, having corresponding shape and length, and in these supports are placed two good electric conductors *e*, *f*, of as little resistance as possible. In the embodiment represented in Figs. 3 and 4, the upper conductor *e* only is provided with a current regulator. To this end, it is provided with a groove, in which are placed the end of several bars *g*, or little blades, cables, etc., of equally good conductivity, having an appropriate section and presenting little resistance to the passage of the current. The other end of these bars, plates, etc., is in intimate contact in a groove of the same shape formed in the end of the source of current *i*. The ends of the conductors *e*, *f*, which are

furthest from the source of current, are provided with the electrodes, *a*, *b*, which preferably are in the form of rollers; one of these electrodes may be pressed, by means of a lever or other similar device, towards the other, or else the two electrodes may be equally pressed the one towards the other.

When the admission of the current to the two electrodes is to be changed, there is removed, as needed, a greater or less number of the bars, plates, or blades *g* of the conductor which supplies the weaker current, (in the case represented, the upper conductor), so as to increase its resistance, whereby a less quantity of current passes through the respective conductor to the electrode.

Naturally, the regulation of the amount of current can also take place at the places of welding which require less current, by means of any other devices which reduce or increase the flow of the current. The operation, when it has to do with welding metal objects of different thicknesses, is as follows:

The sheet metal, or other pieces, to be welded, are placed one above or at the side of the other, after which the electrodes (rollers or not) are applied and the primary circuit is closed. The secondary current generated in consequence of this closing of the primary, passes through the conductor of variable section to the electrodes, and, from there, into the material which is to be welded, and this secondary circuit is completed by the section which is to be welded, that is to say, at the point of weld.

CLAIMS.

1. A process for manufacturing metallic objects of all kinds, and particularly objects composed of relatively thin parts, of different thicknesses, by direct electric welding, characterized by the fact that, to the electrode which is applied against the metal body of greater section, (tin, etc.), there is supplied, at the same potential an amount of current greater per unit of time than to the electrode applied against the metal body, (tin or the like), of less section.

2. The admission of current to the electrodes takes place by means of two conductors belonging to the secondary circuit of a transformer and possessing a feeble resistance, and one of which, or in some cases both, has or have a variable section according to the requirements, in order to be able to feed different quantities of current to the one or the other of the metal bodies to be welded and which have different sections.

3. In the circuit of the one of the conductors are interposed some metallic blades, preferably of copper, easily detachable and carried by suitable shoes, and the number of which, variable according to the needs of the work, determines the quantity of current flowing per unit of time.

W. EGEL.
By E. BLETRY.

Defendant's Exhibit No. 25.

S—290. No 25

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the Specification and Drawing, in the matter of the

French Letters Patent to

EGEL,

Dated October 13, 1903 Number 336,187,

Procede et dispositif pour la fabrication d'objets metalliques de tous genres, principalement des objets en feuilles extremement minces par soudage electrique direct.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 24th day of March, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Acting Commissioner of Patents.

1140

RÉPUBLIQUE FRANÇAISE.

OFFICE NATIONAL DE LA PROPRIÉTÉ INDUSTRIELLE.

BREVET D'INVENTION

du 13 octobre 1903.

VIII. — Mines et métallurgie.

3. — Métaux autres que le fer.

N° 336.187

LIBRARY
PATENT OFFICE

Brevet de quinze ans demandé le 13 octobre 1903, par **M. Wilhelm EGEL** résidant en Allemagne.

Procédé et dispositif pour la fabrication d'objets métalliques de tous genres, principalement des objets en feuilles extrêmement minces par soudage électrique direct.

Délivré le 7 janvier 1904; publié le 1er mars 1904.

La présente invention a pour objet un procédé pour la fabrication d'objets métalliques de tous genres, principalement d'objets en feuilles extrêmement minces, par soudage électrique direct. Le nouveau procédé consiste en ce que l'une des électrodes ou même les deux ne servent pas seulement à amener le courant électrique, mais sont utilisées également pour exercer avant et pendant l'admission du courant électrique, ou bien seulement au moment de cette admission, une pression plus ou moins forte sur le point où doit avoir lieu le soudage. Par conséquent le corps qui conduit l'électricité constitue en même temps l'organe mécanique, de sorte qu'on obtient les conditions de travail de beaucoup les plus favorables, parce que dans chaque procédé de soudage régulier il faut immédiatement, ainsi qu'il est connu, marteler énergiquement ou comprimer le point de soudure amené à la température voulue, pour obtenir une soudure irréprochable.

Or, dans aucun des procédés de soudage électrique connus les corps qu'il s'agit de souder ne sont pendant le soudage pressés solidement l'un sur l'autre par une des électrodes ou par les deux pour favoriser le soudage. Jusqu'à présent on n'exerçait aucune action de compression, ou bien elle avait lieu à une certaine distance du point où s'effectuait le soudage, mais non au moyen d'électrodes centrées, comprimant directement le point qu'il s'agit de chauffer. En un mot, jusqu'à présent on n'a jamais exercé une pression lors du soudage électrique, au moyen d'électrodes, disposées dans la direction du courant, immédiatement au-dessus de la surface de soudure ou du point de soudure.

Pour exécuter ce procédé on peut se servir de différents dispositifs parce que la pression nécessaire sur le point de soudure peut être effectuée au moyen de tous les dispositifs auxiliaires techniques, capables de produire ou de transmettre une pression, par exemple au moyen d'une presse, directement ou par transmission par levier. Cependant ce travail peut être effectué aussi simplement au moyen de leviers à main ou par l'action humaine directe ou indirecte.

Au dessin :

La fig. 1 représente le soudage, effectué suivant le présent procédé, de deux feuilles de même épaisseur, d'une manière intermittente ou par endroits.

La fig. 2 est une élévation de face.

La fig. 3 est une élévation de côté d'un

dispositif de soudage électrique à fonctionnement continu dans lequel l'action de pression est exercée par des électrodes à galet, de sorte que successivement les divers points du joint qu'il s'agit de souder sont réunis avec une consommation minima de courant.

La fig. 4 représente le soudage du joint longitudinal d'un corps creux cylindrique ou conique suivant le nouveau procédé.

La fig. 5 est une élévation de côté d'un dispositif de soudage déjà indiqué à la fig. 1 et dans lequel on se sert, pour exercer la pression, d'électrodes en forme de tenons façonnés, suivant les besoins, et qui peuvent être préparés pour des surfaces de contact aussi restreintes que possible.

La fig. 6 représente deux formes pratiques d'électrodes qui se touchent à leurs extrémités.

Ainsi que le montre la fig. 1, on introduit les deux corps métalliques (fer-blanc ou autre) dont les extrémités se recouvrent, entre les deux électrodes *a b*. De ces électrodes l'une est déjà appliquée légèrement avant le soudage, ou seulement pendant le soudage, ainsi qu'il est indiqué par une flèche, sur l'autre électrode, ou bien les deux électrodes peuvent exercer ensemble une action de pression sur les objets qu'il s'agit de souder.

Pour l'exécution du procédé on peut, lorsqu'il s'agit d'une action continue du soudage pour des jonctions longitudinales, transversales et en rond, employer avantageusement le dispositif représenté aux fig. 2 et 3 du dessin.

Dans les deux conducteurs de courant *c d* (fig. 3) sont insérés, de façon à entrer en contact intime avec ces conducteurs, des organes en forme de fourche *e f*, dont chacun est muni d'une électrode à galet *g* ou *h*, facile à changer: on peut, d'ailleurs, disposer seulement l'électrode inférieure par exemple de façon amovible. De même on peut aussi donner à l'électrode inférieure ou supérieure seule la forme de galet mobile, tandis que l'autre électrode constitue le conducteur de courant établi d'une manière fixe.

Le galet *g* du conducteur supérieur *c* est claveté sur un axe *i* qui est muni d'une roue dentée droite *k*, sur laquelle le mouvement d'un volant à main *l* dissimulé convenablement peut encore être monté directement, c'est-à-dire sans transmission sur l'arbre *g*. En outre l'arbre *i* peut être muni de l'autre côté d'une roue dentée droite, d'une roue conique, d'une poulie de commande, etc., qui sert à actionner mécaniquement l'électrode à galet *g*, dans le cas où on désire un amenage automatique des objets qu'il s'agit de souder par une force motrice. Le volant à main est destiné à accélérer ou à retarder le mouvement de rotation du galet *g* suivant les besoins, ou bien à actionner en général le galet à la main. Le retard ou l'accélération du mouvement de l'axe *i*, lorsque le mouvement est produit d'une manière mécanique, peuvent naturellement être produits par d'autres dispositions mécaniques. La partie supérieure de la fourche qui porte l'électrode *g* est formée dans ce cas en crémaillère *n*, dans laquelle engrène un pignon *p*, monté au moyen d'un collier *o* sur le conducteur *c* et qui est claveté sur un arbre *q* dont l'extrémité extérieure est munie d'un levier *r* à poignée *f*. En élevant ou en abaissant le levier *r* on peut donc écarter ou rapprocher l'électrode à galet supérieure *g* de l'électrode à galet inférieure *h*. En outre on peut, en élevant ou en abaissant la fourche *f* dans le conducteur *d*, élever ou abaisser le galet inférieur amovible *h*.

Si alors on amene entre les deux électrodes à galet *g* les bords de la matière qu'il s'agit de souder et qu'on ferme le circuit, on peut obtenir de cette façon un soudage continu, c'est-à-dire une jonction non interrompue, tandis que l'électrode à galet supérieure *g* peut s'appliquer à volonté sur l'électrode à galet inférieure *h* qui est fixe, ou bien également mobile, de sorte que les deux bords de matière qu'il s'agit de souder se trouvent réunis d'une manière solide.

Au lieu d'amener successivement les objets qu'il s'agit de souder entre les électrodes on peut aussi disposer de façon à pouvoir se déplacer l'appareil électrique à souder en regard des objets fixes.

Lorsqu'il s'agit, par exemple, de souder des fers blancs seulement sur certains points on peut employer avantageusement l'appareil représenté à la fig. 5, dans lequel les électrodes *a* et *b* ont la forme de tenons. Les

teur *d*, tandis que l'électrode supérieure *b* est montée sur une chape *c*, qu'on peut faire tourner au moyen du levier à poignée *f* qui y est relié, autour de l'axe *g*, de telle façon que les pointes des électrodes *a b* se rapprochent ou s'écartent l'une de l'autre. Si alors on amène, par exemple, deux extrémités de fer-blanc qu'il s'agit de souder et qui se recouvrent réciproquement entre les électrodes et qu'on applique énergiquement celles-ci tout en produisant le courant, il se forme un petit point rond de soudure très net qui remplace parfaitement un rivet. Dans ce cas également on peut régler d'une façon exacte, c'est-à-dire maintenir dans les limites voulues, surtout pour des récipients minces qui n'ont pas à subir une pression très forte, la pression exercée sur le point de soudure au moment voulu.

RÉSUMÉ.

1° Un procédé pour la fabrication d'objets métalliques, surtout d'objets faits de feuilles métalliques extrêmement minces, par soudage électrique direct, caractérisé en ce qu'une électrode, ou les deux sont utilisées pour exercer avant ou pendant l'amenage du courant électrique, ou seulement pendant l'émission du courant, une pression de préférence exactement réglable sur le point où le soudage doit avoir lieu.

2° Deux électrodes en forme de galet, l'une ou autres, entre lesquels on introduit les objets à souder (fers-blancs ou autres), dont l'une peut être rapprochée ou écartée de l'autre au moyen d'un levier, excentrique ou autre dispositif, actionné par une crémaillère ou autre dispositif.

3° Pour permettre un soudage continu de joints longitudinaux, transversaux et circulaires, deux électrodes en forme de galet dont l'une ou les deux, maintenues sous une pression convenable, sont actionnées à la main ou au moyen de dispositifs mécaniques pour produire l'amenage de la pièce qu'il s'agit de souder, tandis que celle-ci peut aussi être tirée à travers les électrodes à galet, maintenues sous une pression convenable, une commande spéciale des électrodes à galet étant alors inutile.

W. EGEL.

Par procuration :
E. Bürau.

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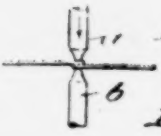


Fig. 1

Fig. 2.

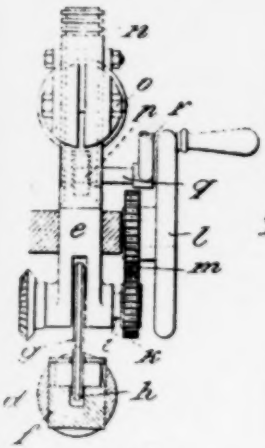


Fig. 3

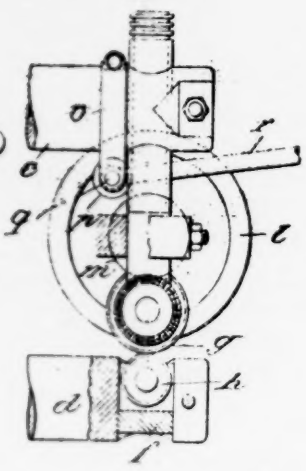




Fig. 4.

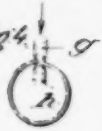
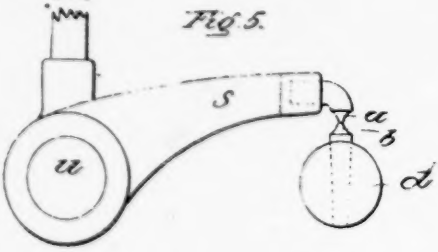


Fig. 6.



Fig. 5.



CLOSE IN CENTER

Defendant's Exhibit No. 26.

TRANSLATION.

FRENCH PATENT NO. 336,187—WILHELM EGEL—
October 13, 1903

Process and Apparatus for the Manufacture of Metallic Objects of All Kinds, Principally Objects of Extremely Thin Sheets, by Direct Electric Welding.

(DELIVERED JANUARY 7, 1904; PUBLISHED MARCH 1, 1904.)

The present invention consists in a process for the manufacture of metallic objects of all kinds, principally objects of extreme thin sheets, by direct electric welding. The new process consists in that one of the electrodes, or else both, do not serve only for conducting the electric current, but are also uesd to exert, before and during the turning on of the electric current, or else only at the moment of such admission, a greater or less pressure at the point at which the welding is to take place. In consequence, the member which conducts the electricity, constitutes, at the same time, the mechanical element, in such a way that much more favorable working conditions are obtained, because in all ordinary processes of electric welding, it is necessary, as is well known, to immediately energetically hammer or compress the point of welding, brought to the desired temperature, in order to obtain a satisfactory weld.

However, in none of the processes of electric welding now known are the bodies to be welded pressed during the operation solidly together by one of the electrodes or by both, to assist in the welding. Heretofore, no compressing action was exerted, or else it took place at a certain distance from the point where the welding was being done, but not by means of the electrodes themselves compressing directly the point to be heated. In fact, up till now, there has never been exerted a pressure, at the time of electric welding, by means of electrodes arranged in the direct line of the current, immediately above or at the welding surface or welding point.

To execute this process, various means may be made use of, because the necessary pressure at the welding point may be effected by means of any auxiliary mechanical devices, capable of producing or of transmitting a pressure, for example, by means of a press, directly or through lever transmission. However, this work may be performed, also, simply by means of hand levers or by means of direct or indirect manual action.

In the drawing:

Fig. 1 represents the welding, performed according to the present process, of two sheets of equal thickness, in an intermittent manner or in spots.

Fig. 2 is a front elevation.

Fig. 3 is a side elevation of a continuous electric welding device

in which the pressure action is exerted by roller electrodes, in such a way that the different points of the joints, which are to be welded, are successively united with a minimum consumption of current.

Fig. 4 represents the welding of the longitudinal joint of a hollow cylindrical or conical object according to the new process.

Fig. 5 is a side elevation of a welding device, already indicated in Fig. 1, and in which there are used, to exert the pressure, electrodes of forms shaped to suit the particular requirements, and which may be adapted for as small contact surfaces as required.

Fig. 6 represents two practical forms of electrodes which touch at their ends.

As shown in Fig. 1, the two metallic objects (tin or the like) are introduced with their ends overlapping between the two electrodes *a b*. One of these electrodes is applied lightly before the welding, or else only during the welding, as is indicated by an arrow, on the other electrode, or else the two electrodes may exert together a pressure on the objects to be welded.

To execute the process, when it relates to a continuous welding action for longitudinal joints, cross joints or circular seams, there may be advantageously employed the means shown in Figs. 2 and 3 of the drawing.

In the two current conductors *c d* (Fig. 3) are inserted, in such a way as to make contact with said conductors, members in the form of forks *e f*, each of which is provided with a roller electrode *g* or *h*, readily interchangeable; however, only the lower electrode, for example, may be made removable. Likewise, the lower or upper electrode only may be in the form of a movable roller, while the other electrode constitutes the current conductor formed of a stationary element.

The roller *g* of the upper conductor *c* is keyed upon a shaft *i*, which is provided with a spur gear *k*, to which the movement of a hand-wheel *l* is transmitted by means of a pinion *m;* the hand-wheel may also be mounted directly, that is to say, without transmission, on the shaft *g*. Furthermore the shaft *i* may be provided on the other side with a spur gear, a bevel gear, a driving pulley, etc., which serves to mechanically actuate the roller electrode *g*, when an automatic feed of the objects to be welded by power is desired. The hand-wheel *l* is designed to accelerate or retard the rotary movement of the roller *g* as needed, or else, generally, to actuate the roller by hand. The retardation or the acceleration of the movement of the shaft *i* when the movement is produced mechanically, can naturally be produced by other mechanical means. The upper part of the fork which carries the electrode *g* is formed in this case as a rack *n*, in which meshes a pinion *p*, mounted by means of a collar *o* on the conductor *c*, and which is keyed on a shaft *q*, the outer end of which is provided with a hand-lever *f*. By raising or lowering the lever *r*, the upper roller electrode *g* may be brought nearer to or further away frow the lower roller *h*. Fur-

thermore, by raising or lowering the fork *f* in the conductor *d*, the lower removable roller *h* can be raised or lowered.

Thus, if the edges of the material to be welded are brought between the two roller electrodes *g* and the circuit is closed, a continuous welding may be obtained in this manner, that is to say, an uninterrupted joint, while the upper roller electrode *g* may be applied as desired on the lower roller erectrode *h* which is fixed, or else also movable, so that the two material edges to be welded are united in a solid manner.

Instead of bringing the objects to be welded successively between the electrodes, the apparatus may be arranged so that it can be moved relatively to the stationary objects to be welded.

When it is required, for example, to weld sheets at certain points only, the apparatus represented in Fig. 4 (?5) may be advantageously employed, in which the electrodes *a* and *b* have the form of pins. The lower electrode *b* is inserted in the conductor *d*, while the upper electrode *b* is carried by an arm *s*, which can be turned by means of a hand-lever *t*, to which it is connected, around the shaft *u*, in such a way that the points of the electrodes *a b* are approached towards or separated from each other. If then, for example, two ends of sheet tin, which are to be welded and which overlap each other, are placed between the electrodes and the latter are firmly pressed together, while the circuit is closed, there is formed a small round point of weld, clearly defined, which takes the place of a rivet perfectly. In this case also, the pressure exerted on the point of weld at the desired moment can be controlled very exactly, that is to say, be maintained within the desired limits, especially for thin vessels which are not to be subjected to a very high pressure.

CLAIMS.

1. A process for the manufacture of metallic objects especially objects made of extremely thin metal sheets, by direct electric welding, characterized by the fact that one of the electrodes, or both of them, are utilized to exert, before or during the passage of the electric current, or else only during the admission of said current, a pressure preferably accurately controllable, at the point where the welding is to take place.

2. Two electrodes in the form of rollers, pins or the like, between which are introduced the objects (sheet tin or the like) to be welded, one of which electrodes may be approached towards or separated from the other by means of a lever, eccentric or other device, actuated by a rack or other means.

3. To permit a continuous welding of longitudnial, transverse and circular joints, two electrodes in the form of rollers, of which one or both, maintained under a suitable pressure, are actuated by hand or by means of mechanical means to produce the feed of the pieces to be welded, while the latter can also be drawn through the roller electrodes, maintained under suitable pressure, in which case a special control of the roller electrodes is unnecessary.

Defendant's Exhibit No. 27.

2—390. No. 27

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a photographic copy from the Records of this Office of the Specification and Drawing, in the matter of the

German Letters Patent to

Nikolas von Benardos,

Dated May 8, 1889. Number 50,909.

for

Verfahren zur Bearbeitung von Metallen durch ortliche Erhitzung derselben mittelst Elektricitat.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 29th day of November, in the year of our Lord one thousand nine hundred and eighteen and of the Independence of the United States of America the one hundred and forty-third.

R. F. Whitehead
Acting Commissioner of Patents.

1138

MANUSCRIPT AND PHOTOLITHOGRAPH DIVISION.

....., 191.

Patentamt

AUSGEGEBEN DEN 19. FEBRUAR

29 1892

KAISERLICHES PATENTAMT.

PATENTSCHRIFT

— № 50909 —

KLASSE 49: Mechanische Metallbearbeitung.

NIKOLAS von BENARDOS in ST. PETERSBURG.

Verfahren zur Bearbeitung von Metallen durch örtliche Erhitzung derselben mittelst Elektricität.

Patentirt im Deutschen Reiche vom 8. Mai 1889 ab.

Die Erfindung betrifft eine neue Anwendung des bekannten Joule'schen Gesetzes der Elektricitätslehre. Die zu bearbeitenden Metalle, vorzugsweise Stücke von geringeren Abmessungen, werden mit einem feuerbeständigen, verhältnifsmäfsig schlechten Leiter der Elektricität (Graphit, präparirte Kohle, Gemenge von Thonerde mit Kohle, Magnesium, Iridium, Kohle mit dünnen Metallüberzügen) in Berührung gebracht, während dieser Leiter von einem so starken elektrischen Strom durchflossen wird, dafs dieser Leiter diejenige Temperatur annimmt, welche für die beabsichtigte Bearbeitung der Metalle gerade erforderlich ist.

Es kann dieses Verfahren dazu dienen, verhältnifsmäfsig dünne Bleche und Stäbe gleichartiger oder verschiedenartiger Metalle unmittelbar mit einander zu verschweifsen, Metallverbindungen unter Anwendung eines Lothes auszuführen, metallene Gegenstände oder Theile derselben für den Zweck der Härtung auf eine bestimmte Temperatur zu bringen und gehärtete Gegenstände durch Erwärmung auf einen bestimmten Hitzegrad anzulassen.

Sowohl hinsichtlich des der Erfindung zu Grunde liegenden Gedankens, als hinsichtlich der Art der Anwendung unterscheidet sich dieses Verfahren wesentlich von dem von Benardos'schen Verfahren, die Metalle unter unmittelbarer Anwendung des elektrischen Lichtbogens zu bearbeiten, sowie von dem elektrischen Schweifsverfahren von Elihu Thomson.

Zur Anwendung des im Vorstehenden charakterisirten Erfindungsgedankens dienen eine Anzahl einfacher Vorrichtungen, aus deren Beschreibung die Eigenthümlichkeiten der Erfindung noch besonders ersehen werden können.

Um zwei dünne Bleche mit einander zu verschweifsen, werden dieselben durch ein biegsames Kabel mit dem einen Pol einer kräftigen Elektricitätsquelle von geringem inneren Widerstand in leitende Verbindung gesetzt. Mit dem anderen Pol dieser Elektricitätsquelle steht ein Löthkolben *K* (s. Fig. 1) in leitender Verbindung; dieser Löthkolben ist in der Hauptsache aus einem die Elektricität sehr gut leitenden Metalle (Kupfer) hergestellt und trägt an seinem unteren Ende in einer passenden Fassung ein kleines Stück *w* des die Elektricität schlecht leitenden, feuerbeständigen Materials; mit letzterem geschieht die Bearbeitung des Werkstückes.

Am anderen Ende ist der Körper des Löthkolbens mit einem Heft versehen, welches die Hand des Arbeiters gegen die Wirkungen der Wärme und der Elektricität schützt.

Sowie der schlechte Leiter *w* die zu bearbeitenden Metallstücke *A' A''* berührt, wird der Stromkreis geschlossen und ein beträchtlicher Theil der elektrischen Energie der Stromquelle wird im schlechten Leiter *w* in Wärme umgesetzt; *w* beginnt alsbald zu glühen. Durch Ausschalten von Widerstand aus dem Stromkreise mit Hülfe eines Rheostaten *C*, Fig. 1, wird die Temperatur des Stückes *w* so lange gesteigert, bis das zu bearbeitende Metall zu schmelzen beginnt. Alsdann wird unter mäfsigem Druck entweder der elektrische Löthkolben längs der herzustellenden Naht oder das zu bearbeitende Metallstück unter dem feststehenden Löthkolben fortbewegt.

die Arbeit beendet, so wird durch einen Ausschalter der Strom unterbrochen und hierauf der Löthkolben vom Metall entfernt.

Um den zu bearbeitenden Metallstücken eine sichere Unterlage zu gewähren, werden dieselben entweder auf eine feuerbeständige, die Wärme schlecht leitende Unterlage Asbest gelegt, oder ein derartiger schlechter Wärmeleiter wird durch eine geeignete Vorrichtung auf der anderen Seite gegen das Werkstück gepreßt. In gewissen Fällen kann es jedoch auch zweckmäßig erscheinen, durch Auflagerung der zu bearbeitenden Stücke auf eine die Wärme rasch abführende Unterlage, Metall, den Widerstand gegen den Druck des Löthkolbens herzustellen.

Bei manchen Arbeiten, für welche die vorliegende Erfindung zweckmäßig erscheint, wird es vorzuziehen sein, zwei sich gegenüberstehende Löthkolben zu verwenden, von welchen der eine mit dem positiven, der andere mit dem negativen Pol einer Elektricitätsquelle verbunden ist, während die beiden Löthkolben von einander isolirt sind.

Fig. 2 zeigt im Grundriß, Aufriß und Seitenansicht eine Vorrichtung, welche zur Ausübung des Verfahrens in dieser eben angedeuteten Weise geeignet erscheint. Zwei Löthkolben *K' K''* sind zu einer Art Scheere oder Zange vereinigt, und sind beide um eine Achse *C* drehbar. Durch isolirende Zwischenschichten wird der Uebergang des Stromes von einem Löthkolben zum anderen durch die Achse *C* unmöglich gemacht. Die Klemmen *D'* bezw. *D''* nehmen die Enden der mit den Polen der Elektricitätsquelle verbundenen biegsamen Kabel auf. Der Strom geht alsdann von *D'* über *K'* nach *w'*, von dem aus schlecht leitendem, feuerbeständigem Material hergestellten Stücke *w'* durch das zu bearbeitende Metall nach *w''* über und kehrt über *K''* und *D''*, durch einen Rheostaten hindurchgehend, zur Elektricitätsquelle zurück. Die Holzhefte der beiden Löthkolben sind wiederum *H' H''*. *F* eine Feder, durch welche die beiden Stücke *w' w''* zusammengepreßt werden.

In Fig. 3 ist eine der in Fig. 2 dargestellten sehr ähnliche Vorrichtung abgebildet. Die beiden Löthkolben werden hier von einem Ständer getragen, von dem sie jedoch durch nicht leitende Zwischenschichten isolirt sind. *D'* und *D''* sind wiederum die beiden Klemmen, welche die den Strom zu- und abführenden Kabel aufnehmen. Der obere Löthkolben besitzt bei *I* ein Scharnier, und *G* ist ein verschiebbares Laufgewicht, durch welches der obere Löthkolben gegen den unteren angedrückt wird. *F'* und *F''* sind zwei Führungsrollen oder auch zwei Walzen, welche außer zur Führung zur Glättung der Löthnaht dienen.

In Fig. 4 ist eine einfache Vorrichtung abgebildet, welche dazu bestimmt ist, stabförmige Gegenstände Ende an Ende zu verschweißen. Zwei Ständer *A' A''*, welche durch die Klemmen *D' D''* mit den Polen der Elektricitätsquelle verbunden sind, tragen oben zwei durch Scharniere befestigte Deckel *B' B''*. In diesen befinden sich Stücke schlecht leitenden, feuerbeständigen Materials *w' w''*, zwischen welchen der Strom von dem einen zum anderen Ständer übergeht. Diese Stücke schlecht leitenden Materials stehen zwar das eine mit dem Metall des einen Ständers, das andere mit dem Metall des anderen Ständers in leitender Verbindung; um denselben aber bei geringem Querschnitt eine angemessene Widerstandsfähigkeit zu geben, sind dieselben durch eine Schicht feuerbeständiger Chamotte- oder Speckssteine in die Deckel *B' B''* eingepaßt. Die Stücke schlecht leitenden Materials besitzen eine dem Querschnitt des zu bearbeitenden Stückes angemessene Nuth.

Läßt man einen elektrischen Strom in *D'* eintreten, so geht derselbe über *A'*, durch das schlecht leitende Stück *w'*, durch das Werkstück *E* nach *w''* und von da nach *A''* über und tritt durch *D''* wieder aus. Die Stücke *w' w''* werden hierbei glühend und bewirken das Erhitzen des zu bearbeitenden Metallstückes *E*.

Fig. 5 stellt eine ähnliche Vorrichtung dar, dazu bestimmt, Drähte Ende an Ende zu verschweißen. Die zu verbindenden Drahtstücke werden zwischen die aus schlecht leitendem, feuerbeständigem Material hergestellten Backen von passender Form *w' w''* gebracht, durch welche, wie bei den vorher beschriebenen Einrichtungen, der Strom hindurchgeht. Bei *E* trägt dieser Apparat eine Feder, durch welche der obere Backen gegen den unteren gepreßt wird. Um den Verlust an Stromwärme durch Strahlung zu vermindern, ist der Haupttheil des Apparates von einem feuerbeständigen, isolirenden und schlecht Wärme leitenden Mantel *M* umgeben, der mit zwei Oeffnungen versehen ist, um dem Werkstück den Durchgang zu gestatten.

In Fig. 6 ist eine Einrichtung abgebildet, welche sich dadurch von den vorhergehenden unterscheidet, daß der Strom nicht durch das zu bearbeitende Metall selbst hindurchgeht. Der elektrische Löthkolben wird vielmehr dadurch hergestellt, daß der elektrische Strom in ähnlicher Weise ein Stück schlecht leitenden Materials durchfließt, wie den Faden einer Glühlampe, und dadurch das schlecht leitende Material zum Glühen bringt. In Fig. 6 sind zwei solche parallel geschaltete Löthkolben *K'* und *K''* zu einer Löthzange vereinigt. Zwischen den beiden durch den Strom zum Glühen gebrachten Stücken schlecht leitenden Materials *w'* und *w''* werden die zu bearbei-

1150

50909

enden Metallstücke von Hand oder durch zur Leitrollen *F* und *F*¹ hindurchgeführt. Diese Anordnung hat den Vorteil, dafs man die Zange öffnen bezw. das zu bearbeitende Metall von der Lötvorrichtung entfernen kann, auch wenn der Strom nicht vorher unterbrochen wird, ohne dafs ein elektrischer Lichtbogen oder elektrischer Funke zwischen Metall und Lötvorrichtung gebildet wird.

PATENT-ANSPRÜCHE:

1 Verfahren zur Bearbeitung von Metallen durch örtliche Erhitzung, welche man dadurch hervorruft, dafs durch elektrische Stromwärme Körper, die aus schlecht leitendem Stoff Graphit, Kohle, Gemenge von feuerbeständigen, nicht leitenden und leitenden Massen hergestellt sind, glühend gemacht und mit diesen das zu bearbeitende Werkstück in Berührung gebracht wird.

2 Zur Ausführung des durch Anspruch 1. gekennzeichneten Verfahrens:

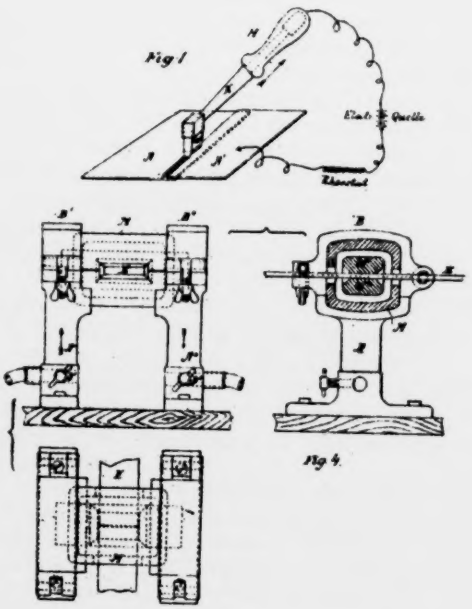
a die in Fig. 1, 2, 3, 4 und 5 dargestellten Vorrichtungen, welche zur Verschweifsung und Verlötung gleichartiger oder verschiedenartiger Metalle oder zum Härten bezw. zum Anlassen von Körpern dienen können und dadurch gekennzeichnet sind, dafs ein elektrischer Strom feuerbeständige, schlecht leitende Körper zum Glühen bringt, indem er durch diese und durch das zu bearbeitende Werkstück selbst hindurchgeht;

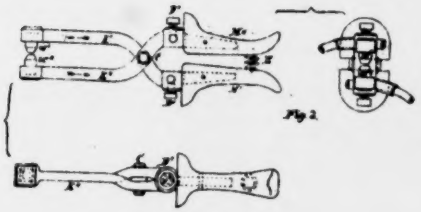
b die in Fig. 6 abgebildete Erfindungsvorrichtung, welche darauf beruht, dafs das zu bearbeitende Werkstück mit einem oder mehreren durch elektrischen Strom glühend gemachten, feuerbeständigen, schlecht leitenden Körpern in Berührung gebracht wird, ohne dafs dabei dieser elektrische Strom durch das Werkstück selbst hindurchgeht.

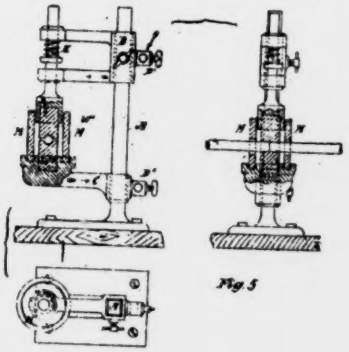
Hierzu 1 Blatt Zeichnungen.

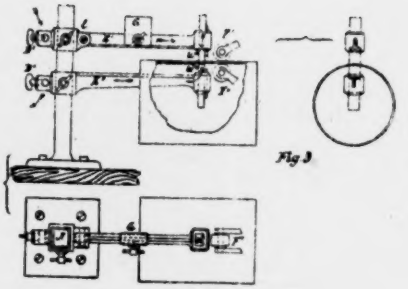
NIKOLAS von BENARDOS in ST. PETERSBURG.

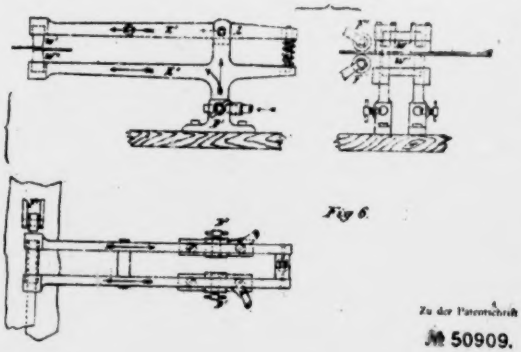
Verfahren zur Bearbeitung von Metallen durch örtliche Erhitzung derselben mittelst Elektricität.











Zu der Patentschrift

№ 50909.

Defendant's Exhibit No. 28.

TRANSLATION OF GERMAN PATENT No. 50,909, NIKOLAS VON BENARDOS.

Patented from May 8, 1889; Issued February 19, 1890.

Process of Working Metals by Heating Them Locally by Electricity.

This invention relates to a novel application of the well known JOULE'S law of electrotechnics. The metals to be worked, preferably pieces of small dimensions, are brought into contact with refractory material which is also a relatively bad conductor of electricity, (for example, graphite, prepared carbon, mixture of clay with carbon, magnesium, iridium, carbon with thin metal coatings,) while said conductor is traversed by an electric current of such strength that it will heat said conductor to that temperature which is exactly required for the desired working of the metals.

This process may serve to directly weld together relatively thin metal sheets and rods, of one and the same or of different metals; to the joining of metals with the use of a solder; to heating metal objects or parts to a definite temperature for the purpose of hardening them, and to annealing hardened objects by heating them to a certain temperature.

This process is clearly distinguished, both from the point of view of the inventive idea on which it is based and from that of its mode of operation, from the prior Benardos process working metals by the direct employment of the electric arc, as well as from the electric welding process of Elihu Thomson.

In putting into practice the inventive idea stated above a variety of simple apparatus may be used, from the description of which the distinguishing characteristics of the invention will be more particularly understood.

To weld together two thin sheets, they are conductively connected by a flexible cable with one pole of a powerful source of electricity of low internal resistance. With the other pole of said source of electricity is conductively connected a welding tool (soldering iron) K, (see Fig. 1,) which is made principally of a metal (copper) which is a very good conductor of electricity, said tool carrying in a suitable holder at its lower end, a small block w of heat refractory material which is also a bad conductor of electricity; it is this block which performs the operations on the metal.

At its other end the body of the tool is provided with a handle of insulating material (wood) to protect the hand of the workman from the effects of the heat and electricity.

The bad conductor w being brought into contact with the pieces of work A', A'', the circuit is closed and a considerable portion of the electrical energy is converted into heat in the bad conductor w, which immediately begins to glow. By cutting resistance out of the circuit with the aid of a rheostat C, Fig. 1 the temperature of the block w is raised until the metal of the work-pieces begins to

melt. Then, while heavy pressure is applied, either the tool is moved along the joint or else the work is moved under the stationary tool. When the joint is welded, the circuit is interrupted by a circuit breaker and the tool is removed from the work.

To provide a safe backing for the work pieces, they are either laid upon a fireproof support which is a poor conductor of heat (asbestos), or else such a bad heat conductor is pressed against the work on the other side from the tool by any suitable mechanism. In certain cases, however, it may be of advantage to make the backing support of the work which resists the pressure of the tool, of material (metal) which conveys heat away rapidly.

For some kinds of work to which the present invention is applicable, it may be advantageous to employ two opposed welding tools, one of which is connected to the positive pole, and the other to the negative pole of a source of electricity, the two tools being insulated from each other.

Fig. 2 shows, in plan, elevation and end view, an apparatus designed to carry out the process in the manner just described. Two welding tools K', K", are united in the manner of a pair of shears or tongs, both being oscillatably mounted on the pivot C. The current is prevented from passing from one tool to the other through the said pivot by the interruption of insulating material. Binding screws D', D", receive the ends of the flexible cables connected to the poles of the source of electricity. The current thus flows from D' through K' to w', from this block of refractory and poorly conducting material through the metal of the work to block w'', and returns through K" and D" and through a rheostat to the source of electricity. H' and H" are the wooden handles, and E is a spring by which the two blocks w' and w'' are pressed together.

Fig. 3 represents an apparatus which is very similar to that shown in Fig. 2. The two tools are here mounted on a standard from which they are insulated by suitable material. D' and D" are here again the binding screws to which the current conductors are connected. The upper tool is hinged at I and G is a sliding weight by which the upper tool is pressed against the lower one. F', F" are two feed rollers, or else rolls which serve to smooth the joint as well as to feed and guide the work.

Fig. 4 illustrates a simple apparatus designed for welding rod-shaped objects end to end. Two standards A', A", which are connected by binding screws D', D", with the poles of the source of electricity, carry at their top two hinged covers B', B", containing blocks w', w'' of heat refractory material which is a poor conductor of electricity, between which the current flows from one standard to the other. These blocks of poorly conductive material are in connection, one with the metal of the one standard and the other with the metal of the other standard; in order to give them sufficient resistance when of small section, they are enclosed in jackets of refactory firebrick or soapstone in the covers B', B". The blocks of poorly conductive material are grooved to fit the work.

When an electric current enters at D', it flows through A', poorly conductive block w' and the work E' to block w'', thence through A'' and out at D''; the blocks w', w'' are thereby caused to glow and cause the heating of the metal piece E to be treated.

Fig. 5 shows a similar apparatus designed for butt welding wires; The wires to be joined are placed between the jaws w', w'' of heat-refractory and poorly conductive material and of suitable shape; the current flows through them as before. This apparatus comprises a spring E by which the upper jaw is pressed against the lower. To reduce the loss of heat by radiation, the main part of the apparatus is enclosed by a jacket M, of refractory, insulating and non-conducting material, the jacket having suitable openings for the work to pass through.

Fig. 6 illustrates an apparatus which is distinguished from those hereinbefore described in that the current does not pass through the work itself. The electric tools are so constructed that the current flows through and heats up a block of poorly conductive material, as it does in the case of electric lamp filaments, and thus raises the poorly conductive waterial to a glowing heat. In Fig. 6, two pairs of such tools K' and K'' are parallelly mounted and combined in a welding tongs. Between the two poorly conductive blocks w', w'', heated by the current to incandescence, the work is fed by hand or by rollers F', F''. This form of apparatus has the advantage that the tongs can be opened and the work removed without the circuit having been opened, for no electric arc or spark will be formed between the work and the tools.

CLAIMS.

1. Process of working metals by local heating, the heat being generated by raising to incandescence, by the passage of an electric current, blocks of poorly conductive material (graphite, carbon, mixtures of fireproof, non-conducting and conducting substances), and bringing the piece to be worked into contact with said blocks.

2. To carry out the process defined in claim 1: (a) The apparatus represented in Figs. 1, 2, 3, 4 and 5, which can serve for welding and soldering the same or different kinds of metal, or for hardening or annealing objects, and which are characterized by the fact that an electric current raises to incandescence fireproof, poorly conductive bodies, by flowing through the same and through the work-piece to be treated itself.

(b) The inventive apparatus represented in Fig. 6, which is based on the arrangement whereby the work-piece to be treated is brought into contact with one or more fireproof, poorly conductive bodies, raised to incandesence by an electric current, without that said electric current flows through the work-piece itself.

Defendant's Exhibit No. 29

COPY OF

ORIGINAL APPLICATION

OF

JOHANN HARMATTA

FOR

IMPROVEMENTS IN ELECTRIC WELDING

FILED DECEMBER 3, 1903

1156

PETITION and POWER

To the Commissioner of Patents,

UNITED STATES of AMERICA.

Your Petitioner Johann Harmatta Engineer, a subject of the King of Hungary residing at Szepesvaralja, in the Kingdom of Hungary prays that Letters Patent of the United States be granted to him for the Improvements in Electric Welding set forth in the annexed specification:

And he hereby appoints Messrs Marion and Marion (J. A. Marion & J. Wilfrid Marion) of Montreal, Province of Quebec, Canada, and Washington, D.C., U.S.A., his Attorney with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign his name to the drawings, to receive the Letters Patent when issued, and to transact all business in the Patent Office connected therewith.

Signed at Budapest, Hungary this 5th day of November, 1903

Johann Harmatta

Address communications to MONTREAL OFFICE

Specification.

To all whom it may concern:

Be it known that I, Johann Harmatta, Engineer, a subject of the King of Hungary, residing at Szepesvaralja, in the Kindom of Hungary, have invented new and useful "Improvements in Electric Welding", of which the following is a specification.

My invention relates to a process of and apparatus for manufacturing metal articles of all kinds, in particular those of the thinnest sheet metal, by direct electric welding. The new process consists in one of the electrodes (or both of them) not only serving to feed the current, but also being employed for exercising a more or less strong pressure either before and during the period of supplying the electric current, or only at the moment of this supply, at the place at which the welding is to be done. The member which feeds the electricity is thus at the same time the tool, and in this manner the most favorable con-

ditions of working possible are secured, since, as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough.

According to none of the present known electric welding processes are the articles to be welded firmly pressed together during the welding operation by one or both electrodes, for the purpose of favoring welding. Hitherto either no pressure has been exerted at all, or it has been exercised at a certain distance from the place of welding, or at all events not centrally direct upon the electrodes pressing on the place to be heated. In short, hitherto direct electric welding pressure has never been exercised by means of the electrodes located in the direction of the current directly above the surface or point being welded.

For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place of welding by the aid of any of those technical means which are suitable for producing or transmitting pressure; e. g., with a press either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power.

In the accompanying drawing

Fig. 1 is a view illustrating the welding of

two metal sheets of equal thickness, intermittently or at certain spots only. 1159

Fig. 2 is a front elevation and

Fig. 3 a side elevation of a device which may be employed for continuous welding, the pressure being exerted by roller electrodes, whereby the advancing series of single points of the seam to be welded is united to a whole with a minimum consumption of current.

Fig. 4 illustrates the method of welding the longitudinal seam of a cylindrical or conical hollow article according to my new process.

Fig. 5 is a side elevation of a welding device (also illustrated in part in Fig. 1) according to which the pressure is exercised by pin shaped electrodes, the form of which may be suited to the particular purpose in view, and which may be adapted to work on the smallest possible surface of contact.

Fig. 6 shows two forms which may be adopted for the ends of the contacting electrodes.

As Fig. 1 shows, the two sheet metal or other bodies, the edges of which lie upon each other, are introduced between the two electrodes *a b*. Of the latter the one, somewhat prior to welding or only during the welding operation, is pressed upon the other, as the arrow shows; or both electrodes may be caused to exert pressure on the objects to be welded.

For continuous welding of longitudinal, cross and circular seams, the device shown in Figs. 2 and 3 of the drawing may be advantageously employed.

In the two conductors *c d* (Fig. 3), forked members *e f*, making intimate contact with the conductors, are introduced, each furnished with a removable roller electrode *g* and *h*; or, if desired, only the lower roller electrode, for instance, may be capable of being removed. Or the lower or upper electrode may be formed as movable roller and the other electrode forms a stationary conductor.

The roller *g* of the upper conductor *c* is keyed to an axis *i* carrying a spur wheel *k* to which the motion of a suitably mounted hand-wheel *l* can be transmitted by means of a spur wheel *m*. Or the hand-wheel may be mounted directly on the shaft *g*, without the use of any intermediate gear-wheels. Or the axis *i* may have on the other end also a spur or bevel wheel, or pulley or the like for driving the roller electrode *g*, should it be desired to automatically advance the object being welded by means of motor power. The purpose of the hand-wheel is to accelerate or decrease the speed of rotation of the roller *g*, as may be required, and in general to actuate the roller by hand for any purpose. The axis *i* may, of course, be caused to move slowly, as in the case of mechanical power, by any other suitable means. The

upper part of the fork carrying the electrode roller *g* is here shown as constituting a toothed rack *n*, in which engages a pinion *p* carried by the conductor *c* by means of a ring-holder *o*. The pinion *p* is keyed to the axis *g*, which carries a hand lever *r* at its outer end. By raising or depressing the lever *r*, the upper roller electrode *g* may be separated from or advanced towards the lower roller electrode *h*. Furthermore by raising or depressing the forked piece *f* in the conductor *d* the lower removable roller *h* may be adjusted higher or lower.

If now the ends of the objects to be welded are introduced between the two roller electrodes *g h* and the circuit closed, continuous welding may be undertaken, that is to say an uninterrupted welded seam made, whereby the upper rotary roller electrode *g* may be pressed with any required degree of pressure upon the lower stationary (or rotary) roller electrode *h*, so that the two ends of the material to be welded are firmly connected with each other.

Instead of the objects to be welded being introduced gradually between the electrodes. the electric welding apparatus may be arranged to slide relatively to the stationary objects.

Thus if it is required to weld, for instance, sheets of metal only at particular places, the apparatus shown in Fig. 5 may be advantageously employed,

1162

the electrodes *a b* having the form of pins. The lower electrode *b* is then inserted in the conductor *d*, whilst the upper electrode *a* is carried by an arm *s* by means of a hand-lever *t* carried by said arm *s* and can be turned on the shaft *u* in such manner that the points of the electrodes *a b* approach and recede from each other. If then two superposed sheet metal ends to be welded together are introduced between the electrodes, and the latter then firmly pressed together and the circuit closed, a small round, very sharply defined place of welding is caused which perfectly answers the purposes of a rivet. In this event, also, especially in the case of thin vessels which are not required to withstand great pressure, the pressure on the place of welding may act at the right moment be exactly regulated or kept within the proper limits.

2 words interlineated

Having thus described my invention, what I claim as new and desire to secure by letters patent is:—

1. The process of electric welding, consisting in employing the electrodes not only to conduct the current to the objects being welded, but also to exert a regulable pressure on the same, substantially as described.

2. An electrode apparatus for electric welding, comprising two electrodes between which the objects to be welded are introduced, and means whereby one of the

electrodes can be approached to and receded from the other, substantially as described.

3. An electrode apparatus for electric welding comprising two roller electrodes between which the objects to be welded are introduced, and means for pressing the electrodes to the work, substantially as described.

4. An electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, means for pressing the electrodes to the work, and means for rotating one or both of the rollers for the purpose of advancing the work in its path between the electrodes, substantially as described.

In Witness whereof I have hereunto signed my name this 5th day of November, 1903, in the presence of two subscribing witnesses.

Johann Harmatta

Witnesses:

Carl Becker

F. LaGuardia

Affirmation.

UNITED STATES CONSULATE;
BUDAPEST, HUNGARY.

Johann Harmatta, the above named petitioner being duly affirmed, deposes and says that he is a subject of the King of Hungary, and resident of Szepesvarálja, in the Kingdom of Hungary, and that he verily believes himself to be the original, first and sole inventor of the Improvements in Electric Welding, described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof; or patented, or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application;

or patented in any country foreign to the United States on an application filed more than twelve months before this application; or in public use, or on sale in the United States for more than two years prior to this application, and that no application for patent for said improvement has been filed by himself or his legal representatives or assigns, in any country foreign to the United States, except as follows: Germany, March 24th, 1903; Sweden, October 12th, 1903; France, October 13th, 1903; Austria, October 14th, 1903; Denmark, October 14th, 1903: Hungary, Oct. 15th, 1903; Switzerland, October 16th, 1903; Belgium, October 16th, 1903.

Johann Harmatta.

Affirmed to and subscribed before me this fifth day of November 1903.

Frank Dyer Chester

SEAL. N.S. 360 United States Consul.

1903.

1136

Canceled per Set Drg May 14. 1904

fig 1.



fig 2.

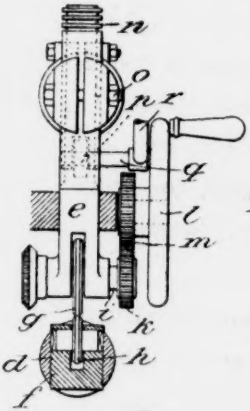


fig 3.

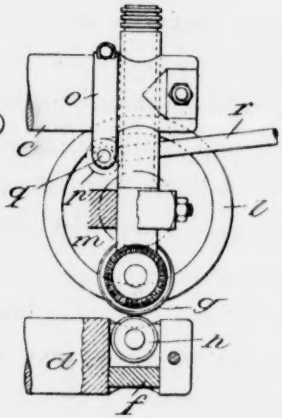




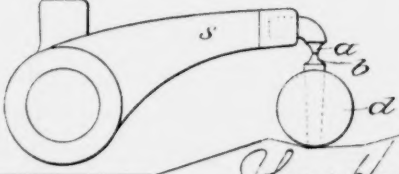
fig 4.



fig 6.



fig 5.



Witnesses:
L. Maynard
M. McAleer

Johann Harnatta
Inventor
by Marion & Marion
Attorneys

S—300.

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the File Wrapper, Contents and all Drawings in the matter of the

Letters Patent of

Sebastian Ziani de Ferranti,

Number 1,[illegible],221, Granted July 27, 1915,

for

Improvement in Processes for Electrically Welding Turbine-Blades.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 6th day of December, in the year of our Lord one thousand nine hundred and seventeen and of the Independence of the United States of America the one hundred and forty-second.

Acting Commissioner of Patents.

2-437 ~~DIV. 13.~~

NUMBER (SERIES OF 1900).

208,034 1904 DIV. ~~39 13~~ 3

(EX'R'S BOOK). ~~4---4~~

PATENT No. 1148221 10/92 - G (1905 Book)

Name Sebastian Ziani de Ferranti

, 190

of Hampstead, London

County of

, filed ~~State of~~ England

Invention Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements

Division of App., No.

PARTS OF APPLICATION FILED.

	ORIGINAL.	RENEWED.
Petition	May 14, 1904	, 190
Affidavit	" " , 1904	, 190
Specification 3 4 3	" " , 1904	, 190
Drawing 12 shts 9 sheets canceled Sept. 27, 1904 1 sheet canceled	" " , 1904	, 190
1 sheet Dec 30 1912 ~~10~~ Dec 29-1914		, 190
Model or Specimen	190	
First Fee Cash $15, May 14	, 1904	, 190
" " Cert.	, 190	, 190
Appl. filed complete May 14	, 1904	, 190
Examined Wm J. Rich Exr Dec. 29	, 1904.	, 190
Countersigned W W Mortimer For Commissioner.		, 190 For Commissioner.
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Final Fee Cash $20 June 30	, 1905	, 190
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Patented	July 27	, 1905
Associate Attorney	Attorney Spear, Middleton Donaldson & Spear	
	City	
Name	Serial Number	
Patent No.	Date of Patent	

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MAY 14 1904 J
CHIEF CLERK U.S.PATENT OFFICE

U.S.PATENT OFFICE,
RECEIVED
JAN 9 1905
DIVISION No.13

~~DIV. 37.~~ PAPER NO.
1/2

208,034.
Application

APPLICATION FOR UNITED STATES PATENT.

PETITION WITH POWER OF ATTORNEY.

To the Commissioner of Patents:

Your petitioner Sebastian Ziani de Ferranti, a subject of the King of Great Britian and Ireland, residing at 31, Lyndhurst Road, Hampstead, London. N.W., England, whose Post Office address is 31, Lyndhurst Road, Hampstead, London, N.W. England, prays that Letters Patent may be granted to him for Process ~~and Apparatus~~ for Electrically Welding Turbine Blades to their Carrying Elements set forth in the annexed specification; and he hereby appoints Messrs. Spear, (Ellis Spear, Walter Donaldson, F.L.Middleton J.M.Spear) Middleton, Donaldson & Spear, of 1003, F,Street, N.W. Washington, D. C., United States of America, his attorneys with full power of substitution and revocation, to prosecute this application, make alterations and amendments therein, to receive the Patent, and to transact all business in the Patent Office connected therewith.

per G.

Sebastian Ziani de Ferranti

1170

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, Sebastian Ziani de Ferranti, a subject of the King of Great Britian and Ireland, and residing at 31, Lyndhurst Road, Hampstead, London N.W., England, have invented a certain new and useful ~~Bladed turbine element and process for the manufacture thereof, Process and Apparatus for Electrically Welding Turbine blades to their carrying elements~~ Process for Electrically Welding Turbine Blades of which the following is a specification:

Apr. 30-09
Oct. 10, 1905
per P

The invention relates to the electrical welding of turbine blades on to the wheels, rings or drums carrying them and has for its object to overcome the difficulties which have been experienced in electrically welding together two such parts differing considerably as regards their power of rising to the required welding temperature when heated at the point of junction, so that blade carrying elements with welded blades may be reliably produced in an inexpensive manner.

The main difficulty arises through the blades and their carriers differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine balde to the carrier to which it is to be secured, it is found that the comparatively large volume of metal forming the carrier, rapidly conducts heat away from the welding point thus preventing the temperature of the carrier rising to the required extent and causing an unsatisfactory weld.

pt. 27, 1904 The ~~first part of the~~ invention, therefore, consists broadly in adjusting the volume of the blade carrying element in the neighbourhood of the welding point so that approximately equal heating occurs in both faces to be welded.

~~The second part of the invention consists in a machine whereby the methods forming the first part of the invention can be carried into effect with great rapidity and accuracy.~~

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Referring to the accompanying drawings, ~~which~~ such

Figure 1 is a part side elevation of a ~~turbine~~ wheel having cross grooves,

Figure 1a being an edge view;

Figure 2 shows a similar edge view of a modification in which sets of intersecting grooves are adopted;

Figure 3 shows an edge view of a form having circumferential grooves,

Figure 3a being a section on the line A A of figure 3;

Figure 4 shows, in a longitudinal sectional elevation, part of a drum carrier to which the baldes are welded in accordance with one form of the invention;

Figures. 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disc, while

Figure 7 is a part side elevation in which holes are bored through from face to face of the disc;

Figure 8 shows a sectional plan of a form of wheel built up of two dished discs, held apart at their circumferential portions by distance pieces,

Figure 8a being a partial ~~scrap~~ edge view to a larger scale;

Figure 9 is a similar sectional plan of a modified

form of wheel built up of three discs, while

per I Figure 9a is a corresponding partial ~~scrap~~ edge view also to a larger scale;

Figure 10 shows a part sectional elevation of a wheel built up of two comparatively thick discs having notched edges,

per P per I Figure 10a being a partial ~~scrap~~ edge view, while

Figure 11 shows an edge view of a form of wheel and

" Insert H1 built up of a series of "stepped" laminae. and

(It will be seen that all the edge views in the preceding figures are shown as developments for clearness of drawing and not as true projections.)

Figures 12 and 13 show a side elevation and plan respectively of the greater portion of the machine;

Canceled Sept. 27,1904. Figure 14 is an end view partly in section, as seen from the right in figure 12,

Figure 15 showing an end view of the welding head but as seen from the left in figure 12;

Figure 16 shows an elevation of the slotting attachment supposed removed in figure 12;

Figures 17 and 18 show sectional elevation and plan respectively of the automatic stopping gear;

Figures 19 and 20 show side and views respectively of a form of blade holder having a mechanical clamping device,.

Figures 21 and 22 being similar but with the clamping device operated electromagnetically.

The same reference symbols are, when possible, used in the accompanying drawings to denote similar parts.

Sept. 27, 1904. In carrying out the ~~first part of the~~ invention according to the form shown in figures 1 and 1a, the turbine wheel or disc is shown at a, cross grooves, b,

being cut in its circumferential edge so as to leave projecting portions of metal, e, to which the turbine blades, d, are welded.

The same object is attained by cutting two intersecting sets of grooves, g, in the edge of the disc, as shown in figure 2, or by cutting circumferential grooves, such as f, completely around the edge (see figures 3 and 3a.)

Figure 4 shows the invention according to one form applied to the case of a drum blade carrier, a'; the drum is grooved circumferentially with grooves, f', the intervening collars of metal being then cross-cut to form projecting teeth, e', on which the blades are welded.

According to a modified form, radial holes, h, may be bored a short distance into the edge of the disc, these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in figure 5, or arranged without particular reference to the position of the blades, (see figure 6).

In figure 7, a method is shown of removing metal in the neighbourhood of the welding point by boring holes, i, through (or partly through) from face to face of the disc at a radius slightly less than that of its outside edge.

The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, whilst at the same time leaving sufficient areas untouched to ensure the mechanical strength in the welded joint.

Referring now to figures 8 and 8a, a form of wheel is shown somewhat diagrammatically which is built up of two dished discs, k, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces such as l, disposed at a radius somewhat less than the maximum radius of the discs, the blades, d, being welded in position on their outside edges.

Figures 9 and 9a show a type of wheel generally similar to that last described but having an intermediate plane disc, m, in addition to the two dished discs, k; a portion, n, of the hub, o, is in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, l, are indicated as before but any other convenient method of holding the discs in their correct relative position may be adopted.

Insert H 2

In figures 8 and 9, the dished discs, k, are indicated as secured to the hubs, o, by pressing the inner edges of these discs into grooves and subsequently burring over the hubs to hold the discs in place.

In the modification shown in figures 10 and 10a, two dished discs, k, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, b, being cut in their edges in accordance with the method described above with reference to figures 1 and 1a. Again, that portion of the disc carrying the blades may be built up of a set of thin laminae, r (see figure 11) the edges of which are notched as at s, the laminae being assembled in such a way that the notches, s, are "stepped" with regard to each other, so that the intervening projections of metal may follow the shape

of the turbine blades to be welded to them.

Instead of notching the laminae, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

pt. 27, 1904. In ~~the first part of the~~ an such as the present invention, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the scope is sufficiently indicated by the many examples given above and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described above by way of example.

wert F1
r. 19, 1904.
wert G1

In carrying the second part of the invention into effect according to one form as shown in the drawings applied to the welding of blades upon a turbine wheel, t, the blade to be welded is held between renewable copper jaws, u, between which it is inserted so as to abut against a suitable stop, Y, these jaws being of suitable shape fixed by screws to the copper jaw holder, w. Details of the jaw holder together with methods of clamping the blades are hereinafter described with reference to figures 8 to 11, 19 22. The shank or end of the jaw holder remote from the blade is made cylindrical and clamped in a cylindrical bearing having a copper cap, x, suitable connected to one pole of transformer, battery or the like. The jaw holder may be clamped in its cylindrical bearing in any position to suit the setting angle of the blades, a wedge such as z, of the necessary taper, being preferably inserted between the jaws holder, w, and a planed surface on the cross-head, 2, carrying the

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cylindrical bearing, thus ensuring the correct angle and safeguarding against its alteration.

The crosshead, 2, works in a slide, 3, and is held in position by slide bars, 4; the lower face of the slide is inclined and co-operates with a corresponding inclined face formed on the welding head casting, 5, thus providing means for giving a delicate vertical adjustment to the crosshead. Studs or the like passing through slots in the welding head and nuts, 6, are provided for clamping the slide in place.

The pressure at the weld is obtained by means of an adjustable spring, 7, acting through a toggle, formed by the double link, 8, on the crosshead 2, and one leg, 9, of a bell crank pivoted on the welding head, 5. A rod, 10, connected to the toggle centre serves to transmit the pressure of the spring, 7, an adjustable stop, 11, being provided to limit the downward movement of the toggle centre. The rod, 10, passes through the spring, 7, and is provided at its upper end with a slot through which passes the tail end of a catch lever, 12, pivoted on the welding head; the pressure of the spring is transmitted to the catch lever through an adjustable set-screw, 13, projecting into the slot. This method obviates any side pressure and consequently friction on the toggle-rod.

The automatic switch, which is of the oil break pattern, is operated from a pair of levers, 14, pivoted on the welding head, by means of the spindle, 15.

A downward pull on the outer end of this double lever, 14, forces the switch on to its contacts against the pressure of a strong spring, 16, and also straightens out the links, 17, above, so that a catch piece, 18, fastened to one of these links, moves under and is

caught by the end of the catch lever, 12, thus retaining the switch in the "on" position. The switch is pulled on automatically as the welding head (operated in a manner to be described) reaches the back end of its stroke, by a bell crank lever, 19, one leg of which comes in contact with a fixed adjustable stop, 20, while the other is linked to the outer end of the double lever, 14, by means of the rod, 21.

The switch (see also figure 14, in which the rod, 21, is removed and the oil well wall partly broken away) is insulated from the levers, 14, by means of the fibre block, 22, forming part of the switch spindle 15, which is carried down into the oil well, 23, conveniently cast in one with the welding head. Two sets of contacts are provided, the upper or primary, 24, being preferably formed of laminated strips of copper; the lower or secondary contacts, 25, are arranged to make contact first and break last, this action being ensured by means of the light spring, 26. The break of the secondary contacts takes place in oil, thus preventing any arcing at the primary contacts. The main contact blocks, 27, to which the leads are connected, and the secondary contacts, 28, are mounted on an insulating ebonite base, 29.

To free itself from a blade that has just been welded, so that the turbine wheel or ring may rotate into position for the next weld, the welding head, 5, travel back in a slide formed in the box casting, 30, which is insulated from the main frame, 31, of the machine, in relation to which it is adjustable by means of studs and slots, adjusting screws or the like means, so that it can be secured in any position to suit different sizes of turbine wheels and lengths

of blades. Slide bars, 32, (see figure 15) constrain the motion of the welding head. This motion of the welding head is taken from a worm, 33, and worm wheel, 34, a sprocket wheel, 35, mounted on the worm wheel shaft, and chain, 36, serving to transmit the motion to a second sprocket wheel, 37, which together with a crank, 38, is mounted on the spindle, 39, this crank being linked to the welding head by means of the connecting rod or pitman, 40. The position of the bracket, 41, carrying the worm wheel, 34, and sprocket wheel, 35, can be adjusted to correspond with that of the box casting, 30. The worm, 33, is driven through a feather by the shaft, 42, the motion of which is so controlled (in a manner to be hereinafter described) as to cause the crank, 38, to make half revolutions alternately backwards and forwards, at the end of each of which the shaft, 42, stops automatically. The sprocket wheel, 37, is insulated from the welding head by means of the fibre ring, 43, seen in figure 15.

Spring buffers, 44, are provided at the left hand end (as seen in figure 12) of the box casting, 30, to take up all back lash in the various joints and ensure a steady pressure at the welding point.

As the welding head approaches the back of its stroke, the switch is closed automatically as mentioned above and the rod, 45, pivoted to the end of the leg, 46, of the toggle bell crank, strikes against the fixed adjustable stop, 47, and causes the toggle centre to rise, thus drawing the blade holder backwards. The leg, 46, of the toggle bell crank is then caught and held by the trip lever, 48, pivoted on the welding head. This lever, 48, is tripped by the crank at both ends of the stroke but at the back end

it is arranged that the toggle bell crank shall be held by the rod, 45, and stop, 47, till after the crank is clear, so that the welding head moves forward with the trip lever, 48, in gear.

The full cycle of operations is thus as follows:- The blade to be welded, having been placed in the jaws, 4, with the welding head in its backward position, the shaft, 42, is started with the switch in the "on" position and both the trip or catch levers, 48 and 12, in gear. The shaft, 42, is stopped automatically (in a manner to be explained) as the blade reaches the turbine wheel and at the same time, the crank, 38, trips the lever, 48, thus freeing the toggle bell crank and allowing the spring, 7, to produce pressure on the weld. The electric current may be controlled by an independent switch under the control of the attendant or this switch may be kept closed during the whole operation, in which latter case the welding starts simultaneously with the tripping of the trip lever, 48. As the blade softens under the heat, the pressure of the spring, 7, causes a slight shortening of the blade, this shortening being greatly magnified by the toggle and causing a comparatively large movement of the rod, 10, which descends and trips the catch lever, 12, thereby leaving the spring, 16, free to act to open the switch. The shaft, 42, is then reversed and the welding head returned to the back end of its stroke, where it is again stopped automatically after switching on the current and setting the trip lever, 48. The adjustable stops, 11 and 13, enable the machine to be set to break contact at the exact time when the shortening of the blade corresponds to a satisfactory weld.

In addition to carrying out the operations described above, an automatically operated attachment is preferably provided whereby the wheel or disc is prepared by slotting, drilling and the like in advance of the weld as regards position on the wheel and without slackening the progress of the welding operation, the machine thus taking a plain wheel or disc and doing all that is necessary to it until it appears as a finished article with all the blades welded on.

If the turbine wheel, 1, is to be prepared by slotting, for example, the slotting head, 49, (see figure 16 where the slotting attachment is shown removed from the machine) is constrained to move in a casing or frame, 50, forming a vertical slide and having a slotted flange, 51, at the base, by means of which it can be adjusted tangentially and bolted to the bed or frame, 31, of the machine; a slot in this frame also enables it to be adjusted longitudinally within the limits of the machine, so as to suit different sizes of turbine wheels. The cutting is done by one or more serrated cutters, 52, carried by the slotting head, the serrations being arranged in steps so that each tooth cuts deeper than the preceding one. In figure 13, two such cutters are indicated, the one being arranged in advance of the other as regards depth of cut. The slotting head is reciprocated by means of an internal screw, 53, engaging with a square nut, 54, fitting in a corresponding recess in the slotting head, 49, the screw, 53, being driven off the main motion shaft, 42, through bevel wheels, 55, one of which is slidably mounted on the shaft, 42, and is driven by a feather, the bracket, 56, which holds this wheel in position being adjustable long-

itudinally to correspond with different positions of the gearing. A clamp, 57, is provided to prevent the wheel vibrating as the cut is taken, this latter operation taking place as the welding head moves forward. After a new blade is welded in place, the motion of the shaft, 42, is reversed, thus causing the welding head to return and withdrawing the serrated cutters through the slots they have just formed. It is not until the cutters are well clear of the turbine wheel, that is to say, not until the welding head is toward the back end of its stroke that the automatic gear is operated to turn the wheel into position for the next weld.

This operation is effected by a rod, 58, passing through a hole in the welding head casting and having adjustable stops, 59, fixed to it. The rod actuates a crank, 60 fixed to it carrying a spring pressed pawl, 61, which co-operates in the usual manner with a ratchet wheel, 62, the motion of this wheel being transmitted by suitably proportioned gear wheels, 63, to the last wheel, 64, of the train, to which the turbine wheel is secured by means of the clamping plate, 65.

The dividing motion mechaniam just described is supported on a suitable stool, 66, which may itself be adjustable with regard to the bed plate, if desired.

The necessary adjustments to allow for different blade spacings are preferably made by altering the ratchet wheel, 62, or by setting the movable stops, 59, so as to cause the pawl, 61, to take the required number of teeth, and leaving the gear wheels, 63, 64, unchanged.

Referring to figures 17 and 18, the method of controlling the motion of the shaft, 42, will now be

described.

To the end of the main shaft, 42, a hollow prolongation of sleeve, 67, is rigidly secured, this sleeve being supported in suitable bearings, 68, and containing in its centre an easily fitting steel rod, 69. On the sleeve, 67, two loose pulleys, 70, 71, are mounted, adapted to run in opposite directions, the bosses of these pulleys being coned to form the male elements of friction clutches. The corresponding female clutches, 72, 73, slidably mounted on the sleeve, 67, are secured to the central rod by cotters, 74, which pass loosely through slots, 75, in the sleeve, 67. Thus a pull on the central rod in either direction will engage one or other of the clutches and the corresponding pulley will then drive the shaft.

As the gear is arranged in the machine described above, it is necessary for the shaft to make twenty revolutions only in the one direction, then to stop automatically and when started again by the attendant, to make exactly twenty more revolutions in the other direction and so on. This is provided for as follows:-

An extension, 76, of the central rod, 69, outside the sleeve, 67, is screwed and engages with a nut, 77, which is prevented from rotating by means of a suitable flat surface formed upon it. As the rod, 69, rotates, the nut, 77, travels along the rod until it comes in contact with one or other of the fixed adjustable stops, 78, through the centre of each of which the rod loosely passes. The nut, 77, being prevented from travelling further, any continuance of the sleeve's rotation, causes the central rod, 67, to be drawn through the nut, thus releasing the particular driving clutch engaged and stopping the shaft, 42.

It is impossible for the attendent to start the shaft again in the same direction, but by pulling the central rod a little further in the same direction as it was drawn by the nut, the other clutch will engage and the shaft run backwards until automatically stopped as before. For the purpose just mentioned, a forked starting handle, 79, pivoted on the bracket, 80, and engaging with collars, 81, in the central rod, is provided.

The two loose pulleys are preferably of different sizes, so that a slower speed is given to the main shaft when the slotting head is cutting than when it is returning.

It will be understood that the automatic stopping mechanism just described is shown detached from the rest of the machine in plan and elevation merely for convenience in drawing as it is preferably mounted on the same rigid frame work as the welding head and other parts above described as indicated in end view in figure 14.

Referring now to figures 19 and 20, details are given of the jaw holder already referred to in the general description of the machine, the stop, Y, alone being omitted.

According to the form illustrated, the jaw holder, W, is provided at the end remote from the blade with a circular shank, 62, which is clamped in its bearing at any suitable angle as already described. The blade end of the jaw holder is separated into two branches by means of the slot, w', each part carrying a copper jaw, U, shaped so as to clear adjacent blades; between the jaws, U, the blade to be welded is clamped and in order to ensure a good contact and rigid holding of the blade in the jaws, a clamping device is preferably arranged in addition to that provided by the spring of

~~the jaw holders~~ the two branches of the jaw holder.

According to one form, links, 83, are pivoted at 84, to one branch of the jaw holder, while short cross links, 85, connect the links, 83, to the other branch, to which they are pivoted at 86. The long links, 83, are curved as shown and are connected at their non-pivoted ends by the cross piece, 87, to which pressure to clamp the blade is applied in the direction of the arrow (see figure 19) by means of the cam, 88, and hand lever, 89, both of which are secured to a common axle rotatably mounted on any convenient pillar, 90, or the like. A spring, such as 91, serves to return the links when the blade is released.

A modification of the clamping device just described is shown in figures 21 and 22, parts corresponding to the previous modification being denoted by the same reference symbols. The links, 83, in this modified form are curved in a contrary direction to those of figures 19 and 20 and their ends are united by an armature, 92, adapted to be attracted by one or more electromagnets, 93, supported in any convenient manner on a bracket or the like secured to the crosshead, 2. The energising current to the magnets may, if desired, be switched on and off automatically.

In the case where blades are to be welded to a turbine ring, the arrangement of parts is essentially the same as that already described with the exception that the ring encircles the welding head.

It will be seen that certain parts of the machine are not completely automatic in their operation but these parts may be readily made so if the additional complication involved is not considered undesirable.

Although the machine has been described with a

slotting head attachment, it will be obvious that in order to carry into effect other of the methods described in the first part of the invention, means for drilling, graded circular cutters or other devices provided with the suitable adjustments required for carrying out the necessary mechanical operations may be substituted.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:-

1. Process for the attachment of turbine blades to their carriers, consisting in so adjusting the periphery of the volume of metal in the carrier in the neighbourhood of the point of attachment by limiting the cross sectional area available for the conduction of heat therefrom, that on heating locally, said blade and said carrier rise to approximately the same temperature and welding the blades to said carriers so prepared, as set forth.

2. Process for the attachment of turbine blades to their carriers, consisting in so adjustably the volume of metal in the carrier in the neighbourhood of the point of attachment by limiting the cross sectional area available for the conduction of heat therefrom, that on heating locally, said blade and said carrier rise to approximately the same temperature and electrically welding the blades to said carriers so prepared, as set forth.

2. Process for the attachment of turbine blades to their carriers, consisting in so removing metal from the periphery of the carrier in the neighbourhood of the point of attachment that on heating locally said blade and said carrier rise to approximately the same temperature and electrically welding the blades to said carriers so prepared, as set forth.

3. Process for the attachment of turbine blades to their carriers, consisting in so grooving the periphery of the carrier in the neighbourhood of the point of attachment that on heat-

ing locally, said blade and said carrier rise to ap-
Oct. 10,1905 proximately the same temperature and ~~electrically~~
welding the blades to said carriers so prepared, as
set forth.

Canceled
Apr. 9,1906 5. The combination of a turbine blade carrier
with blades thereto, as set forth.

Sub. D.
Oct. 18-06 6. The combination of a turbine blade carrier
Apr. 9,1906 with blades electrically welded thereto, as set forth.

7. A bladed turbine element, comprising in com-
the peripheral portion of
Oct.10,1905 bination a blade carrying element, the volume of which
in the neighbourhood of the point of attachment of the
blades has been so adjusted as to retard the flow of
heat away from said point of attachment together with
blades welded to said carrying elements, as set forth.

8. A bladed turbine element, comprising in com-
Canceled bination a blade carrying element, the volume of which
Oct. 10,1905 in the neighbourhood of the point of attachment of the
blades has been so adjusted as to retard the flow of
heat away from said point of attachment together with
blades electrically welded to said carrying elements,
as set forth.

Sub. D
Oct.18-06 6. 9. A bladed turbine element, comprising in
Apr. 9,1906 the peripheral portion of
combination a blade carrying element, from which metal
has been removed in the neighbourhood of the point of
Oct. 10,1905 attachment of the blades so as to retard the flow of
heat away from said point of attachment together with
blades welded to said carrying elements, as set forth.

7. 10. A bladed turbine comprising in combination
having its peripheral portion
Apr. 9,1906 a blade carrying element grooved in the neighbourhood
of the point of attachment of the blades so as to
Oct.10.1905 retard ~~the~~ flow of heat away from said point of at-
tachment together with blades welded to said carrying
elements, as set forth.

Insert B
May 23,1905
Insert C1
Oct. 10,1905

11. A machine adapted to weld turbine blades to their carrying elements, as set forth.

12. A machine adapted to electrically weld turbine blades to their carrying elements, as set forth.

13. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination means for causing a blade and its carrying element to approach and be pressed together; means for leading current to and from the welding point together with means for setting the blade carrying element in position for the next weld, substantially as described.

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t. 27, 1904.

14. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combinations means for causing a blade and its carrying element to approach and be pressed together; means for leading current to and from the welding point; means for removing metal from said carrying element in advance of the welding point together with means for setting the blade carrying element in position for the next weld, substantially as described.

15. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination a rotatably mounted blade carrying element stool; a blade clamp; a slidably mounted welding head carrying said blade clamp together with means for causing said blade clamp to approach said stool, substantially as described.

16. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination, means for causing a blade and its carrying element to approach; a toggle device for producing pressure at the welding point; means for

leading current to and from said welding point together with means for setting the blade carrying element in position for the next weld, substantially as described.

17. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination, a slidably mounted welding head; means including a crank and pitman for reciprocating said welding head together with means for causing said crank to stop automatically at the end of each half revolution, substantially as described.

18. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination, a rotatably mounted blade carrying element stool; a slidably mounted welding head; means for causing said welding head to reciprocate together with means operated from said welding head for turning said stool into a position for the next weld, substantially as described.

19. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination, means for causing a blade and its carrying element to approach; a toggle device for producing pressure at the welding point; a switch together with means operated from said toggle for opening said switch when the weld is completed, substantially as described.

20. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination, a slidably mounted welding head; means for reciprocating said welding head; a switch together with means operated from said reciprocating means for closing said switch, substantially as de-

scribed.

21. A machine adapted to electrically weld turbine blades to their carrying elements comprising in combination a slidably mounted welding head; means for reciprocating said welding head including a main motion shaft; clutches adapted to drive said shaft in either direction together with means including a travelling nut and a screwed slidable extension of said shaft for stopping said shaft at each end of the travel of said welding head, substantially as described.

Insert L^1

1190

In witness whereof I hereunto set my hand in presence of two witnesses.

Sebastian Ziani de Ferranti

Francis James Bignell

Walter. J. Skerten

1191

CONSULATE - GENERAL OF THE UNITED STATES
OF AMERICA FOR GREAT BRITAIN & IRELAND AT LONDON.

I, Henry Clay Evans Consul-General of the United States of America at London, England do hereby make known and certify to all whom it may concern that Wilmer Matthews Harris who hath signed the annexed Certificate, is a Notary Public, duly admitted and sworn and practising in the city of London, aforesaid, and that to all acts by him so done full faith and credit are and ought to be given in Indicature and thereout.

In Testimony Whereof, I have hereunto set my hand and affixed my Seal of Office at London aforesaid, this 28th day of April in the year of our Lord One Thousand Nine Hundred and four

H Clay Evans
Consul-General.

SEAL

1192

OATH.

London
England } ss:

I, Sebastian Ziani de Ferranti, the above named petitioner, being sworn (~~or affirmed~~) depose and say that I am a subject of the King of Great Britain and Ireland and resident of 31, Lyndhurst Road, Hampstead, London, N.W., England, that I verily believe myself to be the original, first, and sole inventor of the ~~improvement in~~ Process and Apparatus for Electrically welding turbine blades to their carrying elements" described and claimed in the annexed specification; that I do not know and do not believe that the same was ever known or used before my invention or discovery thereof, or patented or described in any printed publication in any country before my invention or discovery thereof, or more than two years prior to this application, or in public use or on sale in the United States for more than two years prior to this application; and that no application for patent on said improvement has been filed by me or my representatives or assigns in any country foreign to the United States, except as follows: Great Britain, No. 11921 dated May 25th 1903, and No. 15186 dated July 9th 1903

Sebastian Ziani de Ferranti

Sworn to and subscribed before me this 28th day of April, 1904.

Wilmer M Harris
Notary Public
London

Foreign Fee Stamp.

SEAL

1193

Div. 37 Room 107

2-260

Paper No. 1

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON D. C., June 22, 1904.

MAILED

Sebastian Z. de Ferranti,

C/o Spear, Middleton, Donaldson & Spear.

City.

Please find below a communication from the ***EXAMINER*** *in charge of your application of*

#208,034, filed May 14, 1904, for Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements.

F. I. Allen.

Commissioner of Patents.

A new oath should be filed in accordance with the requirements of Rule 46. See ex parte Levenstein & Maef, 110 O.G., 1726.

Division is required in this case under Rule 41, since claims 1 to 4, inclusive, are drawn to a process; claims 5 to 10, inclusive, are drawn to an article; and claims 11 to 21, inclusive, are drawn to a machine.

Action on the merits will accordingly be deferred until applicant limits his claims to a single invention.

W A Cowles

Actg.

W.J.S.

1194

APPLICATION ROOM
SEP 27 1904
U.S. PATENT OFFICE

Room 107.

DIV. 37, PAPER NO. 2

Amd't.A.

Sept 27, 1904

S. Z. de Ferranti.

Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements.

Filed May 14, 1904.

#208,034.

To the Commissioner of Patents:

Page 2 line 1 cancel "first part of the"

Page 2 erase lines 6 to 9 inclusive.

Page 2 line 10 erase colon and dash and substitute "which, with the exception of figure 4, show the invention applied, by way of example, to a type of parallel flow turbine in which the blades are mounted on the edge of a wheel like body" A1

Page 2 line 11 after "of" insert such and erase " turbine "

Page 3 erase lines 13 to 27 inclusive, i. e., from "figures 12" through to electromagnetically"

Page 3 line 3 from bottom erase "first part of the"

Page 6 line 6 erase "the first part of the" and substitute "an" and after "invention" insert such as the present

Page 6 erase last paragraph from "In carrying" to end of page.

Erase pages 7, 8, 9, 10, 11, 12, 13, 14, 15 and first seven lines of page 16.

Erase claims 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21

Cancel figures 12 to 22 inclusive of the drawings.

The process and product in this case being so intimately connected, it is thought that they should be allowed in one application in accordance with provision of Rule 41.

Respectfully,

S. Z. de Ferrtain,

By Spear Middleton Donaldson & Spear

Sept 25, 1904. Attys.

Div. 13 Roo 329

Address only "The Commissioner of Patents, Washington, D. C." and not any official by name.

2-260 E.E.M.

Paper No. 3

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

Serial No. 208,034

Rejection.

UNITED STATES PATENT OFFICE

WASHINGTON D.C., January 10, 1905.

MAILED " " "

Sebastian Ziani de Ferranti,

c/o Spear, Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of your application for Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements, filed May 14, 1904, Serial No. 208,034.

F. I. Allen

Commissioner of Patents.

Responding to amendment filed September 27, 1904:

Claim 1 is rejected on Parry, 255,329, March 21, 1882, (Class 78, sub 92). This patent shows in Figs. 6 and 7 the application of applicant's principle to the construction of a locomotive frame. To apply this idea to turbine construction is not a matter of invention. This claim is also rejected as functional as the clause commencing "consisting," practically sets forth only the result desired to be attained, viz, uniform heating, instead of the means employed.

Claim 2 is similarly rejected. Further this claim is substantially the same as claim 1 and involves an aggregation for the reason that the particular method of welding, viz, electrically, has no more than its ordinary function in this relation.

Claims 3 and 4 are rejected on Parry. As in claim 2 the inclusion of electric welding involves an aggregation and further constitutes an unnecessary limitation.

Claims 5 and 6 are rejected on the British patent to Roworth, 25,086, of 1893, which shows electrically welded blades. They are also rejected as unpatentable over the German patent to Harle, 143,960, of 1900, which shows riveted blades and the U. S. patent to Elliott, 775,108, Nov. 15, 1904, which shows the blades bolted on.

Claims 7 to 10 are rejected on the references for claims 5 and 6 in view of Parry cited. These claims and claim 6 are objectionable in form as they define the article by the method of making. See Riedon v. Medart, 71 O.G., 751 and ex parte Painter, 57 O.G., 999. The fact that the article must needs be defined by the method of making in order to show novelty, would indicate that if any, only one inventive idea was involved and that was in the process.

E. D. Sewall

B.

2

APPLICATION ROOM
MAY 23 1905
U.S.PATENT OFFICE.
329
Room 107

Serial No. 208, 034 Paper No. 4
Argmt. and Amdt. B.
Filed May 23, 1905

U.S. PATENT OFFICE,
MAY 24 1905
DIVISION No. 13

Filed May 14, 1904.

S. Z. DE FERRANTI'S U.S. APPLICATION, No. 208,034.

Process & Apparatus for Electrically Welding Turbine Blades &c.

To the Commissioner of Patents:

The following is submitted in Reply to the Official Letter of January 10th, 1905. and to be considered in connection with the explanatory sketches hereto attached.

Applicant believes that the U. S. Patent to Parry, No. 255,329, figures 6 and 7, has little or no relevancy to applicant's invention and does not justify the Examiner in rejecting certain of applicant's claims.

The welding of turbine blades to their carriers is an operation of very considerable difficulty and delicacy by reason especially of (1) the great disproportion in size between the blade and carrier and (2) the close juxtaposition of the blades. The first condition renders it difficult to bring the welding points of the two elements to the proper temperature simultaneously without burning the blade; the second condition necessitates a very accurate concentration of heat at the welding point so as to avoid damage to the blades already fixed at a given moment.

The difficulties mentioned do not occur in the manufacture of a locomotive frame; it is to be noted that the portion, B, of the frame is quite comparable in magnitude with the various portions, D, both being of the same thickness and considerable masses of metal, and no difficulty whatever occurs owing to the close juxtaposition of the parts, D. The recesses between the projections, d, in the part, B, of the frame play no part whatever in the actual welding

operation; it will be seen that they are made alternately deep and shallow for the evident purpose of producing the desired contour of the frame. The parts, d, can be easily heated in the smith's fire in turn one after the other, there being ample space between the parts, d, to enable the heating of each part, d, to be effected without detriment to the neighbouring parts, d. It is thought that the figures in question disclose very little which a smith could not accomplish without special instructions; the only new point so far as the smith is concerned being the rounding of the butting portions (see figure 8). That this is the essential novelty of the invention and not the recesses on the part, 8, is clearly shown in the description and particularly in claim 2. It is thought that the recesses in question are purely accidental and play no useful part whatever in the actual process of welding. A sketch is submitted herewith of a locomotive frame in which the recesses between the parts d are replaced by projections; applicant confidently submits that the welding process would not suffer in any way by such substitution so long as the essential rounding winding of the parts d is maintained.

The logical outcome of the Examiner's contention as to disclosure is that a skilled workman, if given a turbine wheel and a set of loose blades could set to work and weld the blades in place without further assistance than the information given in Parry's specification. If the Examiner will put

himself in the workman's place, he will see that success under such circumstances would be little short of miraculous. How, for instance, would it be possible to heat the wheel at the welding point without burning off the blades already in place?

In point of fact, the peculiar conditions which render the welding of turbine blades in place a difficult operation do not exist in the manufacture of a coarse article such as a locomotive frame; they, therefore, were not discussed in Parry's specification and a fortiori no means were disclosed for overcoming them.

In view of the above remarks it is thought that the Examiner's further contention as to the words "electric welding" in claim 2 being an unnecessary limitation is also unsupportable. It is possible, though improbable, that having prepared the blade carriers as described by applicant, it would be possible to heat the welding points by some form of hot blast or the like; applicant, therefore, in claim 1, claimed welding broadly since he believes no one has yet succeeded in producing a bladed carrier with the blades secured in place solely by a butt weld of the type in question and he is entitled to a broad scope of protection. If, however, claim 1 was declared void for any season, claim 2 for "electrical welding" would still be good since actual success has attended this process, the elctrical welding having the specially advantageous property of definitely localising the heat. It will of course be obvious

1200

to the Examiner that the expression "electric welding" is used not in the sense of producing the required heat by playing upon the welding point with an electric arc but by means of the high resistance offered to the passage of electric current past the welding point..

Claims 5 and 6 are re-submitted and the Examiner is requested to point out the relevancy of the German patent to Harlé, No. 143,960 and the U. S. patent to Elliott, No. 775,108. It is not seen in what sense a turbine wheel having blades welded on is anticipated by wheels having blades riveted or bolted on. The welded article is a distinct improvement qua article and approaches closely the ideal form in which wheel and blades are fashioned out of one block of metal.

With regard to the British patent to Raworth, No. 25086/93, each blade is electrically welded to a root-piece thus forming a unit, the separate units being then built up into a wheel rim in various ways. Probably the welding could be effected without difficulty since blade and root-piece are comparable in size and each unit can be manufactured separately thus avoiding the difficulty caused by the close juxtaposition of the blades as explained above. Moreover, Raworth's finished article is clearly inferior to applicant's, including as it does parts such as the side plates and retaining nuts which can work loose. Additional claims introducing the term "plurality of blades" are filed herewith..

Claims 7 to 10 are also re-submitted since the finding in ex parte Painter, 57 O.G., 999, includes the following:-

"A claim for an article of manufacture should not as a rule be defined by the process of producing it; but when an article of manufacture cannot be properly defined except by reference to the process of producing it, a case is presented which constitutes a proper exception to the rule."

It is submitted that the present case is such a "proper exception"; applicant believes himself the first to produce a turbine element having the blades directly secured in place by a butt weld. Such a turbine element is an advance on anything hitherto brought out and protection should not be refused merely on account of limitations in the English and American languages. If an accepted word existed for a turbine element with butt welded blades, a claim for such element would be allowed as a new article, as such a word does not exist, applicant contends that the only course left open is to define the article by the method of manufacture.

Reconsideration of the case is respectfully solicited.

1202

Please insert the following additional claims:-

11- As a new article of manufacture, a bladed turbine element having a plurality of closely spaced blades attached to the periphery of said carrier by direct butt welds.

Canceled Oct.10,1905

12- As a new article of manufacture, a turbine carrier the rim of which is formed of circumferentially continuous metal together with a plurality of closely spaced blades attached to said continuous portion by direct butt welds.

13- As a new article of manufacture, a turbine carrier having circumferential peripheral grooves with intervening projections together with a plurality of closely spaced blades, each blade being attached to at least two of said projections by direct butt welds.

In claims 1 and 2 line 4 after "attachment" insert- by limiting the cross sectional area available for the conduction of heat therefrom.

Respectfully,

S. Z. de Ferranti,

By-Spear Middleton Donaldson & Spear

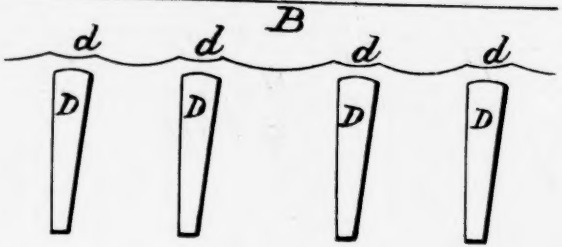
Attys.

May 20, 1905.

1203

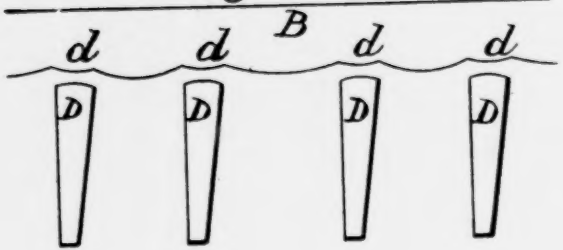
U. S. Patent to Parry, No. 255329.

Fig. 6.



U. S. Patent to Parry, 25. 25532 g.

Fig. 6.



1205

Div. 13 P om 329

Address "The Commissioner of Patents, Washington, D. C." and not any official by name.

2-200

Paper No. 5 Rej.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

D

AEW

DEPARTMENT OF THE INTERIOR

Serial No. 208034

UNITED STATES PATENT OFFICE

WASHINGTON D.C., August 5, 1905.

MAILED * * *

Sebastian Z. de Ferranti,

C/o Spear, Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of your *application of* #208,034, filed May 14, 1904, for "Process & Apparatus for Electrically Welding Turbine Blades to their Carrying Elements".

E.I.Allen.

Commissioner of Patents.

Responding to amendment filed May 23, 1905.

The patent to Perry is waived as a reference. Claims 1, 2, 3 and 4 are rejected as presenting nothing patentable over Swedish patent to Jottrand, #17,093, March 19, 1903, (78-94). This patent discloses, in figures 3 and 4, the idea of reducing the cross-section of the heavier piece of metal in order to secure uniform heating at the welding point. Claim 2 is still considered unpatentable over claim 1, and claim 3 is the same in effect as claim 2.

Claims 5, 6, 11 and 12 are required to be divided out of the case, as the article could be produced by a process other than that recited in claims 1 to 4 (ex parte Erdman, 93 O.G., 2531).

The objection as to defining by the term "welding" in claims 7, 9 and 10 is withdrawn, but such objection relative to electric welding still holds as regards claim 8, for the reason that the term "electrically" imports no characteristic of the article, and has to do simply with the manner of making.

Claims 7, 8, 9, 10 and 13 are rejected as unpatentable over DeLaval, #522,066, June 26, 1894, (121. Rotary Impact, Axial Flow). This patent shows the turbine body with integral blades. The same turbine with a welded connection for the blades instead of an integral one is not considered patentable, for the reason that, except as to the manner of making, the two articles are the same, and if the weld is a good one the blade and the body are integral.

B

E. D. Sewall.

Examiner, Division 13.

APPLICATION ROOM
OCT 10 1905
U.S.PATENT OFFICE.
Room 107

Serial No. 208034 Paper No. 6
Amendment. C
Filed Oct. 10, 1905

U.S.PATENT OFFICE,
OCT 12 1905
DIVISION No. 13

S. Z. de Ferranti.

Process and Apparatus for

Electrically Welding Turbine

Blades to their Carrying Elements.

Filed May 14, 1904.

#208034.

To the Commissioner of Patents:

Please amend the above entitled case as follows:-

In title erase the words "and Apparatus".

Cancel claim 2.

Claim 3, line 6, cancel "electrically" and renumber to 2.

Claim 4, line 5, cancel "electrically" and renumber to 3.

Insert as a new claim:-

4. Process for the attachment of turbine blades to their carriers, consisting in forming circumferential grooves with intervening rings of metal around the carrier thereby limiting the cross sectional area available for the conduction of heat from the point of attachment so that on heating locally, said blade and said carrier rise to approximately the same temperature and welding the blades to said carriers so prepared, as set forth.-

C
Sub. D.
Oct. 18-06

Claim 7; renumber to 5 and line 4 cancel "the" between "retard" and "flow."

Cancel claim 8.

Claim 9; renumber to 6 and line 4 cancel "the" between "retard" and "flow".

Claim 10; renumber to 7 and line 4 cancel "the" between "retard" and "flow".

Insert as a new claim:-

Subs. D. Oct. 18-06

8. A blade turbine element, comprising in combination a blade carrying element having circumferential grooves with intervening projecting rings of metal formed threron and blades welded across the edges of at least two of said projecting rings, as set forth.-

Cancel claims 11 to 13 inclusive.

With regard to the Examiner's rejection of the claims for the article on the U. S. Patent No. 522066, Laval, it is thought that the turbine wheel shown in the specification is purely diagrammatic and was purposely shown so by the patent attorney who drew the specification, since the method of attachment of the blades to the wheel formed no part whatever of the invention concerned. Applicant submits that this specification is not a fair disclosure of a wheel having blades integral therewith. Moreover it is thought that there are many forms of bladed turbine wheels and the like which it would be quite impossible to produce out of a solid block of metal, such for instance, as a turbine wheel having comparatively long blades very closely spaced with regard to one another. Such a wheel could, however, be readily produced by applicant's process.

Taking the four claims for the article now on file, it will be seen that these call specifically for a turbine element in which, (1) the volume of metal has been adjusted in the neighborhood of the point of attachment of the blade; (2) metal has been removed in the neighborhood of the point of attachment; (3 & 4) grooves have been cut; and moreover, welded blades are called for in each case. All these features are new over Laval, in which no metal has been removed, no grooves have been cut and the blades are not welded on.

It therefore appears that a different article must necessarily have been produced. A turbine wheel or the like having blades welded thereto is new in the art, and it appears that whether it has advantages or disadvantages as compared with the existing turbine wheels, it is, nevertheless, a substantially different article to one in which the blades are integral with the wheel or welded or bolted thereto.

Applicant respectfully submits that the Examiner has himself admitted this by withdrawing his objection to the use of the word "welding" in defining the article.

As regards the citation of the Swedish patent to Jottrand #17093 of March 19, 1903, applicant submits the following statement:-

The present application was filed in America on May 14, 1904, and the British equivalent application #11921, 1903, was filed in England on May 25, 1903, as proved by the oath. Consequently it is believed that under the terms of the International Convention, to which Great Britain and America are parties, no publication subsequent to the date of filing in England, viz., May 25, 1903, affords grounds for the rejection of claims in the American application. Now the Swedish Patent to Jottrand #17093, was not published until Feb. 13, 1904, as shown by the note "Offentliggjord dem 13 Februari 1904" at the foot of page 2 of the Swedish specification; it istherefore thought that the citation of the Swedish specification is not in order on the part of the U. S. Office in the present instance.

Respectfully,
S. Z. de Ferranti,
By Spear Middleton Donaldson & Spear
Attys.

Oct. 9, 1905.

Div. 13 From 329

Address "The Commissioner of Patents, Washington, D. C.," and not any official by name.

2-260

M.E.L.

Paper No. 7 Rej.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON D.C., Dec. 16, 1905.

MAILED

Sebastian Ziani de Ferranti,

Care Spear, Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of ~~the~~ your application of

for Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements, filed May 14, 1904, Ser. No. 208,034.

F. I. Allen
Commissioner of Patents.

In response to amendment filed October 11, 1905;

Requirement for a new oath in accordance with decision of Levenstein & Naef, referred to, is repeated.

Claims 4 and 8, it is thought, may be allowed. The examiner believes that an invention was made in the production of the article defined in claim 8.. Whether the invention is in the process or the article may be somewhat doubtful and for that reason it is believed to be proper to allow both claims in the same application.

All of the other claims are rejected in view of the references cited, and the additional reference, patent to Cowdery, 481,663, August 30, 1892, Class 76, Subclass 111. The application of the old method disclosed in Cowdery to the manufacture of a turbine wheel is thought to involve no invention.

Attention is invited to the fact that claims 5 and 6 of the original specification have not been canceled although applicant's procedure indicates that he intends to cancel them.

Pen and ink drawings are required.

E. D. Sewall

Examiner, Division 13.

1210

APPLICATION ROOM
APR 9 1906
U.S.PATENT OFFICE.

Serial No. 208,034 Paper No.
Amendment
Filed April 9, 1906

Room 107.

U.S.PATENT OFFICE
APR 11 1906
DIVISION 13

S. Z. de Ferranti.

Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements.

Filed May 14, 1904.

#208034.

To the Commissioner of Patents:

Referring to the U. S. patent to Cowdery, #481663, cited by the Examiner, applicant desires to submit the following statement.

It is thought that the method of Welding the braces to the heads of rakes disclosed by Cowdery cannot be held to be an anticipation ofapplicant's method according to U. S. patent law unless (1) a mere application, involving no ingenuity whatever, is possible of Cowdery's method to turbine work, and (2) unless the arts of rake making and turbine building are reasonably cognate.

Applicant believes that neither of these conditions in point of fact exists. Cowdery's method of stamping out a blank with two luge which he subsequently bends at right angles is obviously inapplicable as it stands to turbine work and for this reason something more than the mere application required by law is necessary to adapt it. Thus the "cresent-moon" section of a turbine blade made it impracticable, after the broad principle had been discovered, to form projections of similar section on the turbine wheel in the manner disclosed by Cowdery and much trial work was necessary in view of the pronounced disproportion in dimensions between turbine wheel and blades before it could be confidently stated that the methods disclosed in applicant's specification were or were not successful.

Applicant wishes especially to emphasize the fact that it is the great disproportion in dimensions between turbine wheel and blade which has occasioned the practical difficulties met with which have hitherto prevented a welded turbine element of the type in question being produced. This difficulty does not occur in the rake shown by Cowdery where the section of the braces to be welded is apparently the same as that of the base member of the head to which it is held, both parts being considerable masses of metal of no great difference in size.

Furthermore, it is thought that the arts of rake making and turbine building cannot be considered so closely allied that processes known in the one art can be considered available for use in the other. Applicant with a large practical experience in all branches of engineering, believes that no common knowledge existed at the time of his invention which would assist in the solution of the blade-welding problem, and it is thought that a very special process confined solely to such a backwater of the engineeringtrade as rake-making cannot be held to be such "common knowledge" and should not preclude the grant of a patent for improvements in an art of the importance of turbine-making.

Reconsideration of the case is respectfully solicited in view of certain of the following amendments drafted in order to connect the invention more definitely with turbine production.

Cancel claims 5 and 6 of the original specification.

Claim 1, line 3; claim 2 line3; claim 3, line 2; between "the" and "camer" insert-periphery of the-

Claim 5, line 2; claim 6 line 2; before "which" insert - the peripheral portion of-

Claim 7 line 2; after "element" insert-having its peripheral portion-

Applicant is considering the question of filing a division al application.

A new oath and drawings will be filed before this case goes to issue.

Respectfully,

S. Z. de Ferranti,

By- Spear, Middleton, Donaldson & Spear

Attys.

Apr. 6/06.

AMT

Div. 13 From 329

Address "The Commissioner of Patents, Washington, D. C.," and not any official by name.

2—260

Paper No. 9 Rej.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR Serial No. 208034

AEW

UNITED STATES PATENT OFFICE

WASHINGTON D.C., May 1, 1906.

MAILED

Sebastian Z. de Ferranti,

C/o Spear, Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of your *application of* #208,034, filed May 14, 1904, for "Process & Apparatus for Electrically Welding Turbine Blades to their Carrying Elements".

E. I. Allen

Commissioner of Patents.

Responding to amendment filed April 9, 1906.

Attention is again called to the requirements for a new oath and for pen and ink drawing.

Claims 1, 2, 3, 5, 6 and 7 have been carefully reconsidered, and they are rejected on the references and for the reasons of record.

Claims 4 and 8 stand allowed.

E.A.P.

E.D.Sewall

Examiner, Division 13.

APPLICATION ROOM
OCT 18 1906
U.S.PATENT OFFICE

U.S.PATENT OFFICE,
OCT 19 1906
DIVISION No. 13

Serial No. 208034
Paper No. 10
Argument and Amendment.
Filed Oct. 18 1906

Room 329
S. Z. de Ferranti.

Process and apparatus for Electrically welding turbine Blades to their Carrying Elements.

Filed May 14th, 1904.
208034

To the Commissioner of Patents.

With respect to the reference Cowdery of record applicant wishes to point out that there is no disclosure of his process by Cowdery; on a careful perusal of Cowdery's specification it will be evident to one skilled in the art that Cowderys method consisted in heating the parts separately to a welding heat before uniting them as in lines 55 et seq he causes "the meeting surfaces which have been heated to welding heat by the current to be brought against each other and uniting them" There is no dubiety in the language of the specification; the parts have been heated to welding heat before being brought together, so that Cowderys method presents no similarity to the applicants in which the welding current is lead across the junction of the parts to be welded. That such a method was never invented by Cowdery is evident from the passage quoted above and also to the following parts of his specification. In line 44 et seq. Cowdery intimates his intention of applying electric welding to the manufacture of his rakes. There are three kinds of welds which present themselves to his mind viz., Butt, scarf or T welds. It must be borne in mind that these joints are intended to be formed electrically and the problem which he has to solve is which joint will be preferred for his rake. He chooses the

butt or scarf weld in preference to the T weld his reason for such preference being as stated in line 59 that if T welds were formed it would be necessary to heat the whole head of the rake to the welding temperature. Had Cowdery even contemplated using the applicant's method in which the welding current is led across the junction of the parts to be welded no heating of the entire head of the rake would have been necessary and owing to the parts being of similar cross section a perfectly good weld could have been formed. In order to avoid clamping the whole head of the rake in the clamps and heating to welding heat, Cowdery forms two projecting lugs on the head and thus obviate the necessity of raising the whole of the head to the welding temperature. These lugs were clamped between the terminals of a suitable welding circuit heated to welding heat and then united to the braces which had been similarly heated.

This interpretation of Cowdery's specification, applicant submits is the only one which agrees with the language used in the specification and applicant holds that the diversity of the respective arts should not allow a strained interpretation to be put on Cowdery's specification to the detriment of an invention which has solved the problem of expeditiously attaching turbine blades to their carrying elements in an exceedingly affective manner. Furthermore the problem before Cowdery was that of attaching two parts by electric welding which were situated remote from one another; in fact an ordinary piece of electric welding which would present little or no difficulty to any person once the idea of electric welding was

known as the heat capacities of the parts were practically equal. In the applicants invention however the difficulties of welding efficiently masses of metal which differ in proportion to their heat capacities as much as 10,000 and over to 1 would in no whit be minimised by a perusal of Cowdery's specification while in addition to such difficulty a further one is presented by the exceedingly close juxtaposition of the blades. It will be evident that this latter difficulty is entirely overcome by the method which the applicant has shown in his specification, i.e., by limiting the cross sectional area at the point of attachment. This method allows the heat to be concentrated or localised at the welding point and so prevent heating of an unnecessary large amount of metal in ~~that~~ the neighbourhood of the weld. Without any localisation of the welding parts it will be obvious that the rate of welding would be greatly decreased as the time required to heat the parts to the welding temperature would be increased owing to larger mass of metal to be heated.

The above difficulties do not occur in Cowdery's method so that his invention cannot in the applicants opinion be deemed an anticipation of the applicants invention which has solved the difficult problem of uniting turbine blades to their carrying member in an expeditious, economical and satisfactory manner.

With respect to Raworth of record applicant submits that in the specification the blades are not welded directly to their carrying element, the welding being simply mentioned as an alternative for soldering the blades to the rings and that the claims as now amended are clear of the above and other references

cited by the Examiner.

Claims 1 and 2 have been amended so as to clearly differentiate between the applicant's process and Cowdery's; claim 3 has been refiled as none of the references show "grooving the carrier in the neighbourhood of the point of attachment". The pertinency of the reference is not seen. Claims 4 and 7 as now on file have been allowed; claims 5 and 6 have been substituted for those rejected on the last official action. A reconsideration of the case is respectfully solicited on the above grounds and it is hoped that the case will soon pass to an early allowance.

Cancel all the claims and substitute the following:-

2. ~~1.~~ Process for the attachment of turbine blades equalizing the heat capacity of the welding parts by to their carriers, consisting in limiting the cross sectional area of the carrier available for conduction of heat from the point of ~~attachment~~ contact, causing blade and carrier to contact and leading welding current through the point of contact, as and for the purposes set forth.

3. ~~2.~~ Process for the attachment of turbine blades equalizing the heat capacity of the welding parts by to their carriers, consisting in removing metal from the carrier in the neighbourhood of the point of ~~attachment~~ contact, thereby limiting the cross sectional area available for conduction of heat therefrom, causing blade and carrier to contact and leading welding current through the point of contact, as and for the purposes set forth.

4. ~~3.~~ Process for the attachment of turbine blades to their carriers, consisting in so grooving the carrier in the neighbourhood of the point of attachment that on heating locally, said blade and said carrier rise to approximately the same temperature and welding the blades to ~~the~~ said carriers so prepared.

~~4. 5. 6. 7.~~ Process for the attachment of turbine blades to their carriers, consisting in forming circumfer-

ential grooves with intervening rings of metal around the carrier thereby limiting the cross sectional area available for the conduction of heat from the point of attachment so that on heating locally, said blade and said carrier rise to approximately the same temperature and welding ~~the~~ blades to ~~said carriers as prepared~~, as set forth.

per K. Insert E¹ Feb. 16-07

each

a plurality of said rings

said

7. ~~6.~~ A bladed turbine element comprising in combination a blade carrying element having depressed portions on its peripheral area with intervening portions raised relatively to said depressed portions and blades welded to said relatively raised portions, as set forth.

Canceled Apr. 19-07.

8. ~~6.~~ A bladed turbine element comprising in combination a body portion; blade carrying members proper attached to said body portion by one face and having blades welded to an opposite face together with spaces intervening between said blade carrying members, as set forth.

F

5 ~~4.~~ 4. ~~9~~ 2.² A bladed turbine element, comprising in combination a blade carrying element having circumferential grooves with intervening projecting rings of metal formed thereon and blades welded across the edges of ~~at least two~~ certain of said projecting rings, each blade being welded to a plurality of said projecting rings, as set forth.

Canceled per O

per K. per I Insert B² Feb. 16-07

Insert H⁴

Respectively

Sebastian Z. de.Ferranti

By Spear, Middleton, Donaldson & Spear

Attys.

H.H.S.

AM.

Div. 13 R. n. 329

"The Commissioner of Patents, Washington, D. C.," and not any official by name.

2-260

Paper No. 11 Rej.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

D

AEW

DEPARTMENT OF THE INTERIOR Serial No. 208034

UNITED STATES PATENT OFFICE

WASHINGTON

MAILED December 10, 1906.

Sebastian Z. de Ferranti,

C/o Spear, Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of the application of your

#208,034, filed May 14, 1904, for "Process & Apparatus for Electrically Welding Turbine Blades to their Carrying Elements".

P. I. Allen

Commissioner of Patents.

6-2611

Responding to amendment filed Oct. 18, 1906.

Claim 1, 2 and 3, which are for a process, and claims 5 and 6, which are for an article, are all rejected as being unpatentable over Cowdery, of record. Claims 5 and 6, although for an article, do not set forth and define any structure which patentably differentiates from the patent upon which these claims are rejected.

Applicant is also referred to the patent to Hunter, #690,958, Jan. 14, 1902, as further showing a process of electric welding.

Claims 4 and 7, which are old claims 4 and 8, stand allowed.

E.A.P.

E. D. Sewall

Examiner, Division 13.

APPLICATION ROOM
FEB 16 1907
U.S.PATENT OFFICE

U.S.PATENT OFFICE,
FEB 18 1907
DIVISION 13.

Serial No. 208,034
Paper No. 12
Amendment & an
Argument
Filed Feb. 16th 1907.

Room 239
S.Z. de Ferranti.
Process and apparatus for Electrically welding turbine blades to their carrying elements.
Filed May 14th, 1904
No. 208034.

To the Commissioner of Patents:-

Insert as claim 1:-

Substitute F Apr. 19. 07. a

1. Process for the attachment of blades to their carrying elements consisting in equalizing the heat capacities of the welding parts by limiting the cross sectional area of the carrier available for the conducting of heat from the point of attachment, so that on heating locally said blade and said carrier rise to approximately the same temperature and welding the blades to said carriers so prepared.

Renumber claims 1, 2, 3 and 4 as claims 2, 3, 4 and 5 respectively.

Old claim 1, now claim 2, line 2 after "in" insert "equalising the heat capacity of the welding parts by";

line 4 change "attachment" to contact

Old claim 2, now claim 3, line 2 after "in" insert "equalising the heat capacity of the welding parts by"

line 3 erase "at"

line 4 erase "tachment" and insert "contact" therefor.

Insert as claim 6.

Ba Canceled Apr. 19-07.

6. A bladed turbine element comprising in combination a blade carrying element and a plurality of blades attached thereto by welds, said welds acting to transmit working stresses between said blades and said carrying element, as set forth.

Renumber claims 5, 6 and 7 as 7, 8 and 9.

Insert as new claims:-

10. A welded turbine element comprising in combination a blade carrying element having a circularly disposed aggregation of depressed portions alternating with relatively raised portions and blades welded to said relatively raised portions, as set forth.

11. A bladed turbine element comprising in combination a body portion; a circularly disposed aggregation of blade carrying members proper attached to said body portion by one face and having blades welded to an opposite face together with spaces intervening between said blade carrying members, as set forth.

12. A bladed turbine element comprising in combination a blade carrying element having a plurality of raised portions with relatively depressed portions disposed on both sides of said raised portions and blades welded to said relatively raised portion, as set forth.

The Examiner is reminded that claims 5 and 9 stand allowed.

It is respectfully submitted that the amended claims are free from the reference Hunter of record who shows no "equalisation of the heat capacities of the welding parts" which is one of the essential elements of the applicants invention. Hunter arranges the heat capacities of the parts at the welding point in as great disproportion as possible so that the projections on one of his parts become a mass of molten metal before the welding operation is effected.

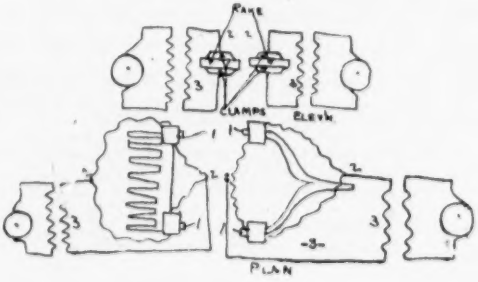
In the applicant's invention the temperature of the parts never rise above the welding temperature and fusion of the parts is carefully avoided.

With regard to Cowdery also of record applicant respectfully submits that as Cowdery does not disclose

one of the steps in applicants process viz., leading the welding current through the point of contact that the process set forth in the claims rejected on this reference is certainly novel.

Further when the state of the art is examined it is found that one of the great difficulties encountered in the manufacture of turbines is that of providing efficient means for attaching the blades to the carriers. One of the most usual method of attachment is by means of caulking strips which at best forms an antiquated and very unworkmanlike species of jointwithout taking into consideration the time and labour involved.

By means of the process described in his specification the applicant is able to weld blades to the carriers at the rate of 400 per hour while the strength of the weld is such as to permit them to be hammered over at right angles to the position in which they were originally welded. The process which enables blades to be attached so expeditiously and efficiently in comparison with the present cumbersome methods in the applicants opinion ought to be patentable the more especially when it is considered that the anticipating reference relates to a backwater art like rakemaking and which as will now be shown does not disclose the applicants invention.



Referring to lines 50 to 59 of Cowdery's specification and to the sketches inserted above which have been provided with reference numerals to illustrate Cowdery's method, the following statement is found.

"In electric welding the two pieces, 1, to be welded are suitably clamped in the terminals, 2, of a circuit, 3, carrying a current of large volume and of low tension and the clamps (s), 4, holding the pieces are thereupon brought together with great force bringing the meeting surfaces which have been heated to welding heat against each other and uniting them."

It will be evident that such a method does not disclose the applicant's process as there is no suggestion of leading the welding current through the point of contact.

Cowdery heats each part individually to welding heat on the attainment of which both are forced together. The welded parts of Cowdery's rake are so far apart as to present no difficulty in this connection and the weld could have been effected without the slightest difficulty in the ordinary manner.

To apply Cowdery's process to the rotor for example of a turbine of the Parsons type it would be necessary to keep a cylinder of metal some 6 ft. long say at a welding heat during the whole welding operation, which would obviously be self-damnatory.

The applicant however was the first to perceive that by equalising the heat capacities of the welding parts and leading the welding current across the point of contact thereby localising and concentrating the heat it was possible to electrically weld blades to a rotor successfully both from the practical and commercial standpoints even although the proportion of the heat capacity of the

and
roter/ blade would in ordinary circumstances amount to as much as 10,000 to 1.

Cowdery disclosed no adjustment of the heat capacity because as has been stated above the materials with which he was dealing were practically of the same size and section. Cowdery did not disclose leading the current through the points of contact; Cowdery's process was a mere case of substituting one species of welding for another and lastly the arts of rake and turbine making are not so closely allied as/ to amount to mere application. On these grounds applicant is of opinion that claims 1, 2, 3 and 4 ought to be allowed.

With regard to claims 6 and 7 applicant is unable to perceive how a claim for a bladed turbine element is rejected on a rake.

Claim 6 calls for "a blade carrying element having depressed portions on its peripheral area with intervening portions raised relatively to said depressed portions" This claim calls for a plurality of raised portions alternating with depressed portions which is certainly not disclosed in Cowdery's specification. Claim 8 calls for "blade carrying members proper attached to the body portion by one face and having blades welded to an opposite face". Applicant is unable to understand the ~~pertinacity~~ pertinency of the reference in respect to this claim.

As the article of manufacture claimed is novel in addition to being stronger and able to be more expeditiously manufactured than those at present on the market it is thought that the claims at present on file ought to be allowed.

If the Examiner persists in his rejection of the claims applicant would esteem it a favour if he would do so finally in order that the case may be taken to

appeal.

1225

Respectfully,

Sebastian Z. de Ferranti.

By Spear Middleton Donaldson & Spear

Attys.

AM.

Div. 13 Room 329

Address "The Commissioner of Patents, Washington, D. C." and not any official by name.

2-260

Paper No. 13 Rej.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

Serial No. 208034

UNITED STATES PATENT OFFICE

AEW

WASHINGTON D.C., March 11, 1907.

MAILED

Sebastian Z. de Ferranti,

C/o Spear, Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the ***EXAMINER*** *in charge of your application of*

#208,034, filed May 14, 1904, for "Process & Apparatus for Electrically Welding Turbine Blades to Their Carrying Elements".

F. I. Allen

Commissioner of Patents.

Responding to amendment filed Feb. 16, 1907.

Claim 1 is rejected on Cowdery, of record. The claim amounts in substance to the process of attaching one set of members (the "braces B) of Cowdery to a second member (the head A of the rake in the same patent), which consists in equalizing the heat capacities of the welding parts by limiting the cross-sectional area of the second member available for the conducting of heat from the point of attachment, so that on heating locally said first member and said second member they rise to approximately the same temperature, and welding the blades to said second member so prepared. Would it not be well for applicant to place a comma after "temperature" in line 7 of this claim?

Applicant in his argument states, on page 4 of the amendment filed Feb. 16, 1907, that "It will be evident that such a method does not disclose the applicant's process, as there is no suggestion of leading the welding current through the point of contact". Applicant is referred to lines 39 to 70 of the Cowdery patent, above referred to. The examiner considers that the said patent discloses the employment of the "process of welding ordinarily employed", which is substantially the same process as that described in the patent to Eyre, #585,160, June 22, 1897, (78-82x), (see page 1 of the specification, lines 27 to 41). It is further considered that the Cowdery patent also discloses

de Ferranti, #208,034 -- 2.

that it is old to weld "by equalizing the heat capacities of the welding parts and leading the welding current across the point of contact" which applicant in his argument asserts that he is the first to perceive (see lines 39 to 70 of the Cowdery patent, above referred to, and especially the subject-matter of lines 66 to 70). Hunter, of record, also shows the welding together of two members by forming projecting portions and sending the current through and heating locally in the vicinity of the projecting portions.

Claims 2, 3 and 4 are rejected on the references and for the reasons given in the rejection of claim 1.

Claims 6, 7 and 8 are rejected on Cowdery. While these claims are drawn to be for a "turbine element", they define no structure (for example, taking claim 7) which is anything more than an element having in combination a depressed portion (for if there are projecting portions there are depressed portions, and vice versa) on the outer portion with intervening portions raised relatively to said depressed portions, and members welded to said relatively raised portions, as set forth. Such a structure is clearly unpatentable over Cowdery.

Claims 5 and 9 stand allowed.

Claim 10 is broad enough to read on figures 1, 1^a, 2, 5 and 6, and is unpatentable in view of Cowdery.

Claim 11 is for a different species from that for which claim 9 has been allowed, and is not readable upon the same structure which claim 9 represents. Therefore no action on the merits of this claim has been make, and the claim is required to be canceled. Applicant is referred to ex parte Cook, 51 O.G., 1620.

Claim 12 is rejected as claim 10.

E.A.P.

E.D.Sewall
Examiner, Division 13.

12281

APPLICATION ROOM
APR 19 1907
U.S.PATENT OFFICE

U.S.PATENT OFFICE
APR 22 1907
DIVISION 13

Serial No. 208,034
Paper No. 14
Amendment. F & Argument
Filed Apr. 19 1907

Room 107.

S. Z. de Ferranti.

Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements.

Filed May 14, 1904.

#208,034

To the Commissioner of Patents:

Erase all claims excepting 5 and 9 and insert:-

Sub P'

1- The method of attaching turbine blades to their carrier of relatively great mass, which consists in adjusting the heat capacity of localized areas of the carrier at the point of attachment, by ~~limiting the heat conduction between~~ partially isolating these areas from the remainder of the carrier ~~and the relatively great mass~~, so that a welding temperature may be reached notwithstanding the cooling effect of the mass of thecarrier, and passing electric heating current directly through the carrier, and by way of clamps through the blades to weld the blades in succession ~~successively~~ to the carrier, substantially as described.

per J.

F

per I

2- The method of attaching turbine blades to their rotor carrying element ~~and maintaining the balance of the rotor~~ consisting the equalizing the heat capacities of the welding parts by limiting the conducting areas of the carrier, at the points of blade attachment, symmetrically in relation to the axis of rotation of the rotor, and enclosing the blade between clamps so that on heating locally by the electric current the blade and carrier rise to approximately the same temperature and welding the blades to the carriers so prepared. -

per I

per J.

Insert H3

At the end of the specification insert:-

F'

The elctric heating current is passed directly through the carrier and by way of clamps through the blades. -

There is a clear difference between the method set forth in the above claim and that of Cowdery. In Cowdery the purpose is to prevent heating up and burning of the body of the rake. In de Ferranti's case, on the contrary, the purpose is to provide a way by which to oppose the cooling tendency, due to the heat conducting capacity of the larger mass of metal to which the comparatively small blades are to be welded.

Cowdery's problem was to prevent burning up the body of the rake. de Ferranti's problem was to get sufficient heat at the attaching points of the blades, notwithstanding the tendency of the heat to be dissipated throughout the larger mass.

Cowdery in his method provided clamps for holding the body of the rake to keep it out of the heating circuit.

Applicant does not employ clamps for the carrier, but passes the current directly through the larger mass of metal, and he limits the conduction of heat between the attaching point or area for the blade and said larger mass so that a sufficiently high temperature for welding purposes will be secured at the point of contact.

It is submitted that the problem to be dealt with by applicant arose because of the requirements and conditions of this particular art, i.e. that of making bladed carriers for turbines and although applicant isto be charged with the knowledge of the Cowdery patent it is not thought that this knowledge would suggest the present method.

Applicant was not facing the problem of preventing the carrier from burning, as its comparatively great mass in relation to the blades rendered this impossible, but he had to provide means of preventing the rapid cooling tendency of the larger mass from dissipating the heat away from the attaching points or areas and thus preventing a good weld.

Furthermore, it has been the practice heretofore in attaching blades to rotors, to calk them in place, or to hold them by filling pieces together with calking. As a result of this method, and owing to inequalities, it has been necessary to balance the rotors by boring cavities therein at various places and filling the same with lead, a process requiring skilled labor and the expenditure of considerable time. With my present process in which the limited conducting areas of the carrier are disposed symmetrically in relation to the axis of rotation, and in which the blades are welded to these symmetrically disposed areas, the rotor as is comes from the welding process requires no special balancing. Applicant has thus produced an advance in the art of making rotors for turbines and one not suggested in any way by the Cowdery patent. If any advantage results from applicant's process in this specific art, it is thought he should have protection on the advance which he has made.

Applicant reserves the right to file a divisional application for the article.

Respectfully,

S. Z. de Ferranti,

By-

Spear Middleton Donaldson & Spear

Attys.

April 18, 1907.

REO

Div. 13 R m 329

Address only "The Commissioner of Patents, Washington, D. C." and not any official by name.

2-260

Paper No. 15 Rej.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

AEW

UNITED STATES PATENT OFFICE

Serial No. 208035

WASHINGTON, D. C., June 4, 1907.

MAILED

Sebastian Z. de Ferranti,

C/o Spear Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of your *application of* #208,035, filed May 14, 1904, for "process & Apparatus for Electrically Welding Turbine Blades to their Carrying Element".

E. B. Moore.

Commissioner of Patents.

6—2632

Responding toamendment filed April 19, 1907.

Claims 1 and 2 are rejected as being unpatentable over Cowdery, of record. and Eyre, also of record, in view of Moxham, #496,890, May 19, 1893, (219-10). In claim 2 applicant has included as an element "maintaining the balance of the rotor"; this phrasemerely states what is the result of the process, rather than aiding in defining the process.

Claims 3 and 4 stand allowed.

E. A. P.

E. D. Sewall

Examiner, Division 13.

APPLICATION ROOM
MAY 9 1908
U.S.PATENT OFFICE

U.S.PATENT OFFICE,
MAY 13 1908
DIV. 13.

Serial No. 208
Paper No.

Room 382

Amendment

G. Z. de Ferranti Filed May 9, 1908
Process and apparatus for electrically welding turbine blades to their carrying elements.
Filed May 14th 1904.
Serial No. 208034.

To the Commissioner of Patents:

Erase "and apparatus" from the title of the specification.

Insert at the end of the specification.

"By means of my invention it will be seen that the blades are attached to their carrying elements in an expeditious and efficient manner while in the case of rotors a still further advantage is obtained over the methods of blading commonly employed inasmuch as it properly carried out the attachment of the blades by electric welding introduces no change of symmetry with respect to the axis of rotation and consequently dispenses with the tedious operation of balancing otherwise rendered necessary."

With respect to the rejection by the Examiner of claims 1and 2. applicant respectfully submits the following in support of their patentability. First with regard to Cowdery's specification applicant would point out that Cowdery's specification should be considered totally apart from any knowledge subsequently acquired from applicant's specification and the test applied whether a skilled workman with Cowdery's specification as the state of knowledge in the art could evolve the applicant's process without exercise of the inventive faculties. What information then would such a person obtain from Cowdery's specification? Would it be sufficient to teach the public how to perform the applicants

process? In the first place, the problems in question are entirely different. Cowdery seeks to avoid the occurrence of a high temperature for fear of burning the parts concerned; applicant on the other hand and in direct opposition to this seeks to secure a temperature in the carrier high enough for welding. Cowdery, in other words gets too much heat; applicant cannot get enough in the carrier or if he can runs the risk of burning the small blades. Applicant's solution of the problem consists in two parts:- (a) partially isolating a part of the carrier by grooves and the like to prevent rapid conduction of heat away from the welding point by limiting the available cross sectional area and (b) artificially increasing the mass of the blade being welded by clamping it between copper jaws of large heat capacity and leading the current not directly to the blade but by way of the clamps. There is thus a contrast in the manner of treating the carrier and the blade; current is led directly to the partially isolated portion of the carrier but only indirectly to the blade by way of the heavy copper clamps which enclose the whole of the blade with the exception of the extreme tip. The carrier is thus compelled to rise to the welding temperature while the blade is prevented from burning. Or put differently the very large mass of the carrier and the very small mass of the blade rise in temperature at approximately the same rate. To secure this result has been ~~the~~ Applicant's outstanding difficulty throughout and it is only achieved by a differential treatment of the parts to be welded.

Cowdery's specification is ambiguous on many

points but there is clearly no suggestion of the differential mode of leading current to the welding point now emphasised in applicant's claim 1. Neither is there in Moxham of record. In each case this is explained by the fact that neither Cowdery nor Moxham was contemplating the welding together of two parts differing to any considerable extent as regards mass and heat capacity while applicant on the contrary deals directly with such a case.

Turning to claim 2, the point is made of maintaining the balance of the rotor by cutting the grooves, recesses or the like "symmetrically in relative to the axis of rotation of the rotor". It appears indisputable that no such suggestion is made by either Cowdery of Maxham.

For the above reasons it is requested that claims 1 and 2 as they now stand may be reconsidered.

Respectfully,

S. Z. de Ferranti,

By Spear Middleton Donaldson & Spear

Attys.

H.H.3.

A.M.

1235.

Div. 13 B'n. 329

2-260

Paper No. 17 Re.

Address "The Commissioner of Patents, Washington, D. C." and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

D

AEW

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

Serial No. 208034

WASHINGTON June 5, 1908.

MAILED " " "

Sebastian Z. de Ferranti,

C/o Spear, Middleton, Donaldson & Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of your application of

#208,034, filed May 14, 1904, for "process for Electrically Welding Turbine Blades to their Carrying Elements".

E. B. Moore.

Commissioner of Patents.

Responding to amendment filed May 9, 1908.

The action with respect to claims 1 and 2 is believed to be correct, and is adhered to. To the formation of the carrier in a certain way it is considered immaterial/ whether the electric heating means is connected directly to the carrier, and to the blades or by some other means, by clamps/, and therefore these elements, it is considered, do not aid in conferring patentability to the claims. It is true that Cowdery, of record seeks to avoid the occurrence of high temperature, for fear of burning the parts concerned, but it is considered that he does substantially the same thing that applicant does, and for the same purpose, only stated in a different way. Cowdery makes one part smaller at a certain portion, so that he can heat the reduced part to a welding heat in the same time that the other part to be connected thereto is heated to a welding heat, and in both the case of Cowdery and of applicant the same difficulty is encountered, namely, heating a relatively large part to a welding heat at a certain point in the same time that a smaller part is heated to the same temperature. Cowdery has solved the problem how to do this.

Attention is called to Rule 50, which requires that the drawings show every feature of the invention covered by the claims. There is nothing in the drawings of this application which shows the clamping means or the connections between the electric heating means and the elements to be welded.

E. A. P.

E. D. Sewall

Examiner, Division 13.

APPLICATION ROOM
APR 30 1909
U.S.PATENT OFFICE

U.S.Patent Office,
MAY 3 1909
Division XXVIII.

Serial No. 208,034
Paper No. 18
Amendment H

Room 382.
S. Z. de Ferranti
Bladed Turbine Element and Process for the manufacture thereof.
Filed May 14th, 1904.
Serial No. 208034.

To the Commissioner of Patents.

Reply to Office action of June 5th, 1908.

Sir,

Reply to Official action of June 5th 1908.

Change title to "Bladed turbine element and process for the manufacture thereof".

Page 3, at end of line 8, insert the word "and", and between lines 8 and 9 insert as a new line:-

H' "Figs. 12 and 13 show a form of clamp and a diagram of the electrical connections".

Page 5, between lines 17 and 18 insert as a new paragraph:-

H2 "In every case it will be seen that those portions of the carrier to which the blades are to be welded are partially isolated from the body of the carrier bu slots, holes and so forth so as to limit the cross-sectional area available for the conduction of heat, and so compel the carrier to rise to the welding temperature. On the other hand to prevent the blades being burnt away, their mass is artificially increased by holding them between clamps or jaws of high heat conductive material such as copper.

Thus referring to figures 12 and 13, the jaw holder 63, is separated into two branches by means of the slot, 64, each branch carrying a copper jaw, 65, shaped so as to clear adjacent blades. Between

the jaws, 65, the blade to be welded is clamped, so as to leave the tip only exposed as seen in figure 13, and in order to ensure a good contact and rigid holding of the blade in the jaws, a clamping device is preferably arranged in addition to that provided by the spring of the two branches of the jawholder.

According to the form shown links, 66, are pivoted at 67, to one branch of the jaw holder, while short cross links, 68, connect the links, 66, to the other branch to which they are pivoted at 69. The long links, 66, are curved as shown, and are connected at their non-pivoted ends by the cross-piece, 70, to which pressure to clamp the blade is applied in thedirection of the arrow (see figure 13) by means of the cam, 71, and the hand lever, 72, both of which are secured to a common axle rotatably mounted on any convenient support, 73. A spring such as 74, serves to return the links when the blade is released.

The necessary electrical connections to affect the welding are shown diagrammatically on figure 13, in which G, represents an appropriate source of alternating current, and T, a transformer. It will be seen that while the lead, $\underline{t}'$, may be connected directly to the carrier $\underline{a}$, as in the example shown, it is necessary on the other hand that current to the blade, $\underline{d}$, should be conveyed indirectly by way of the jaw holder, 63, and lead, $\underline{t}^2$."

1228 ✓ .Insert the following as new claims:-

3. Process for the attachment of turbine blades to their carriers consisting in partially isolating those portions of the carrier in the neighbourhood of the points of attachment of the blades, to limit the cross-sectional area available for the conduction of heat therefrom; artificially increasing the volume of the blades by contacting them with metal masses of high heat conductive capacity and finally welding together the carriers and blades so prepared.

H3

~~4.~~ Process for the attachment of turbine blades to their carriers consisting in partially isolating those portions of the carrier in the neighbourhood of the points of attachment of the blades, to limit the cross-sectional area available for the conduction of heat therefrom; artificially increasing the volume of the blades by contacting them with metal masses of high heat conductive capacity, and finally welding together the carriers and blades so prepared by passing electric current to the blades by way of said metal masses.

per I.

~~5.~~ 4. Process for the attachment of turbine blades to their carriers consisting in partially isolating those portions of the carrier in the neighbourhood of the points of ~~the~~ attachment of the blades, to limit the cross-sectional area available for the conduction of heat therefrom; artificially increasing the volume of the blades by clamping them between metal masses of high heat conductive capacity so that the tip of the blade only is exposed and finally welding together the carriers and blades so prepared.

per J.

Change claims Nos. 3 and 4, to 6 and 7 respectively, and insert the following as new claims:-

7. ~~6.~~ A bladed turbine element having partially isolated portions and blades welded thereto.

per J.

H⁴ 8. ~~9.~~ A bladed turbine element comprising in combination a blade-carrying element having circumferential grooves with intervening projecting rings of metal formed thereon, and uniformly spaced blades welded to said projecting rings.

9. ~~10.~~ A bladed turbine element comprising in combination a blade-carrying element having a portion of uniform curvature and blades welded thereto, said blades being disposed at equal distances from the centre of said uniform curvature.

10. ~~11.~~ A bladed turbine element comprising in combination a blade-carrying element having an axis of symmetry and blades welded thereto in positions symmetrically disposed about said axis.

Insert I'

Attention is respectfully drawn to the fact that the present application was originally filed in combination with application Serial No. 236048, which has since matured into patent No. 911222. Applicant therefore respectfully requests permission to reinsert the figures and corresponding description of the blade clamp originally on file, but cut out subsequently when dividing the application.

A new sheet of drawings is filed herewith to be made of record. The process claims which at present stand rejected, applicant proposes to appeal in due course and takes no further action in relation

to them for the present.

With regard to the three new process claims filed herewith, applicant believes that these have points of novelty over anything shown in the reference.

To sum up the position shortly once again, applicant has met with two difficulties in welding turbine blades to their carrying elements:-

(a) On account of the large volume of the carrier, the heat is conducted away from the welding spot so quickly that the required temperature cannot be reached, while

(b) the small mass of metal in the blades renders them peculiarly liable to be overheated and burnt.

These difficulties are overcome respectively by partially isolating appropriate portions of the carrier to ensure the temperature of these parts rising to the required degree, while on the other hand artificially increasing the mass of the blades by putting them into good electrical contact with suitable masses of copper or other high conductive material, the current being led to the blade by way of these metal masses.

This artificial increas of the mass of the blades is a vital and essential part of applicant's process since in this way alone can the delicate blades be kept sufficiently cool. The blade carrier and the blades have thus to be treated differentially. The carrier must be assisted to rise to the required welding temperature, while the blade must be assisted to keep sufficiently cool. It is

believed that this opposite differential treatment of carrier and blade for a specific purpose is not to be found in any of the references cited.

A careful reconsideration of the case as amended is respectfully solicited.

Respectfully,

S. A. de Ferranti

By

Spear Middleton, Donaldson & Spear

Attorneys.

HHG/LW.

1214

APPLICATION ROOM
DEC 8 1909
U.S. PATENT OFFICE

Serial No. 208034
Paper No. 20
Amendment I and Sketch

Room 329
Sebastian Z. de Ferranti
Serial No. 208034
Filed May 14th, 1904
Process for electrially welding turbine blades to their carrying elements.

To the Commissioner of Patents.

Sir,

This amendment is in reply to the Official letter of May 24th, 1909. A new oath is filed herewith.

not entd
See Examiners letters
also Amend F.

Page 2, line 31,

Page 3, lines 2 and 7,

Change "scrap" to "partial"

Insert figures 12 and 13 filed with the last amendment.

Page 2, line 20, insert "Figure 4a shows an elevation of the carrier shown in figure 4".

Claim 1, line 9, change "successively " into "in succession".

Claim 2, lines 2 and 3 erase " and maintaining the balance of the rotary".

Claim 7, line 5, erase "at least"

line 5, erase "two" and insert therefor "certain".

With regard to claims 1, 3 and 5 which the Examiner has objected to upon Cowderey, Eyre and Moxhan, the applicant would very respectfully point out that none of these specifications disclose the applicant's process.

Taking for example Cowderey's specification, it appears to the applicant that a different construction would be given to the language used by the Cowderey specification by persons who had not seen the applicant's process, and by persons who were familiar therewith. The article which Cowderey proposes to manufacture is one involving no special difficulties with regard to welding, as it is obvious to anyone skilled in the art that by forming slight projections on the back of the rake for welding the fork thereto the necessity of heating up the whole of the head of the rake would be dispensed with. Cowderey in fact wished to protect the points of his rake from the deleterious action which would result from being heated up to the welding temperature; he consequently resorts to a method which is very well understood in the art, and by making a slight projection on the back of the rake he welds the fork thereto.

In this specification the problem is not presented of welding an article like a turbine blade on to a blade-carrying element, the blade-carrying elementsbeing generally of much greater mass than the turbine blade, and it is respectfully submitted that Cowderey's specification would not materially assist any person who had the above problem to solve.

What the applicant does is to partially isolate the parts of the carrier upon which the blades are to be welded, and in addition thereto hold the blade in such a way as to artificially increase its heat capacity, or in other words, the heat capacity of the smaller mass is augmented while the heat capacity at the point where the blade is welded on

to the larger mass is reduced so as to allow the welding operation to be performed as efficiently as possible. Cowderey's specification does certainly not disclose a method of increasing the smaller part to be welded, and unless an exceedingly strained interpretation can be put upon the language which he uses, in the applicant's opinion he does not disclose a method of welding together parts of a dissimilar mass by reducing the heat capacity of the latter. Cowderey's process is simply one which would be chosen for convenience by blacksmith if he has faced the problem of welding a fork to the head of a rake, such as Cowderey wishes to manufacture by employing one of the very well known methods in the art. The applicant, however, had a much more difficult problem to solve, and not only were the masses so very dissimilar but the difficulties for obtaining a good weld were infinitely more than in the case with Cowderey's specification.

With regard to Moxham's specification it is submitted that the two pieces to be welded here are of practically the same mass as one another, and consequently no difficulty is experienced, unless the difficulty which Moxham provides for by isolating part of one of the members in order to localise the heat supplied by the passage of current therethrough, as if the whole cross section of the rail were to be welded at once the current required would be enormous.

Kyre's specification discloses the form of welding machine, but as the applicant does not claim,

a machine for performing the operation of welding but a process, it is submitted that beyond disclosing a machine for electric welding Eyre has very little bearing upon the applicant's process.

The applicant therefore submits that the process which he has disclosed in claims 1, 3 and 5 are not found in either of the specifications which the Examiner has cited, either individually or collectively as no person skilled in the art, from a perusal of these specifications would be put in possession of the applicant's process without exercise of the inventive faculties.

In view of the above these 3 claims are respectfully resubmitted for the Examiner's consideration.

Cancel claim 4.

With regard to claim 2, which the Examiner has rejected on Cowderey and Moxham, the applicant would refer him to what has been said above with respect to claims 1, 3 and 5.

Re-number claims 5 to 11 as 4 to 10.

With regard to claim 7 which the Examiner has rejected on De Laval of record taken with either Cowderey and Moxham, the applicant would point out that in this claim he has set forth a turbine element having partially isolated portions and blades welded thereto. In neither of the specifications cited by the Examiner against this claim is a turbine blade element disclosed at all having the blades welded to the carrier, as in De Laval's specification the applicant is unable to discover how the blades are formed, and from the appearance in the drawings

he concluded that they are formed integrally with the carrier.

With regard to claims 8 and 9, which are rejected as not being patentable over allowed claim 7, the applicant cannot agree with his view, as the differentiating feature of uniformly spaced blades welding to the carrying element appears to him to be a sufficient differentiation from claim 6.

With regard to claim 10 the applicant can here only repeat what he has said with regard to claim 7, that De Laval discloses no turbine element having the blades welded thereto, and consequently he does not consider that De Laval's patent is in any way a disclosure of the blade element shown in the applicant's specification.

In view of the above remarks it is respectfully requested that the Examiner will reconsider the case and the appliant hopes that it will soon be passed to an early allowance.

Insert new figure 4a filed herewith and the following claims:-

I' per J

11. A process for electrically welding masses of dissimilar cross-section of conductivities consisting in equalising the heat capacities of the masses in the vicinity of the welding spot and passing current through the point of contact of said masses.

12. Process of electrically welding masses of dissimilar cross-section of conductivities consisting in reducing the heat capacity of a mass of greater conductivity, increasing the heat capacity of the mass of lesser conductivity and

passing current through the point of contact of said

wires.

Respectfully,

Sebastian Z. de Ferranti

By

Spear, Middleton Donaldson & Spear

attorneys.

WB/LW.

1230

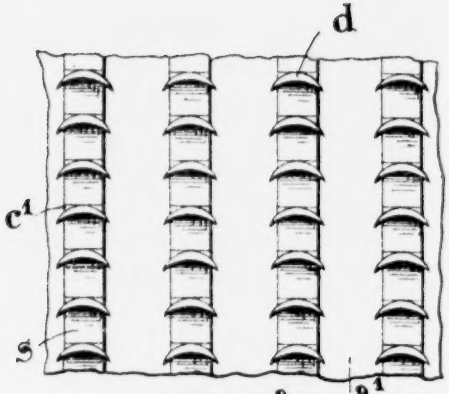


Fig. 4ª.

Div. 13 Room 329
(Address only "The Commissioner of Patents, Washington, D. C.")

2-260

Paper No. 21
(All communications respecting this application should give the serial number, date of filing, and title of invention.)

1.251

EAP

AEW

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE
WASHINGTON

Jan. 14, 1910.

Sebastian Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D.C.

Please find below a communication from the EXAMINER in charge of your *application,* #208,034, filed May 14, 1904, for "Process for Electrically Welding Turbine Blades to their Carrying Elements".

E. B. Moore,
Commissioner of Patents.

Responding to amendment filed Dec. 8, 1909.

The oath referred to in the first paragraph of the above amendment has not been received.

Figures 12 and 13 were not filed with the last amendment, and therefore can not be entered, as directed in lines 7 and 8 of page 1 of the amendment.

The brief description of figure 4^a has not been entered in line 20 of page 2, as the place in said line where the same should be entered has not been designated. The entry of new figure 4^a is refused, as it does not appear to be necessary in order to make clear the invention claimed and is held to involve new matter.

Claims 1 to 4 are rejected as of record. The patent to Cowdery alone is considered to anticipate the claims. The rake parts in Cowdery are electrically welded and held by clamps, and these clamps will cause a material increase of the part having the relatively small mass of metal. Is not the heat conduction limited by making a projecting portion comparatively small relative to the rest of its surrounded portion,? If so, claim 1 should bring this out. This, however, will not aid in conferring patentability to the claim. The steps set forth in claims 3 and 4 are not all shown, namely, the increasing the volume of the blades.

de Ferranti, #208,034--2.

Claim 5 stands allowed, and also claim 6, subject to an amendment in next to the last line which will bring out the fact that each of the blades is welded to a plurality of the rings. As the claim was amended, it does not bring out this feature so as to bring out the utility of the projecting rings.

Claim 7, and also claims 9 and 10 are rejected on the ground that they are directed to the same invention as that for which applicant has already received a patent, namely, de Ferranti, #274,398, De. 24, 1907.

Claim 8 is rejected as not patentably different from that allowed in claim 6 (former 7), especially in view of De Laval, of record, which shows that it is old to have the blades "spaced uniformly"

Claims 11 and 12 are required to be canceled, as they are for a process of electrically welding metals, examinable in another division of the office, in the same class as Lachman, #923,128, May 25, 1909, and Moxham, #497,808, May 23, 1893, (219-10), and they are for an independent invention from that for which claims have been prosecuted before the office (see ex parte Belle, 110 O.G., 1728).

E.A.P.

C.A. Nixon .

Examiner, Division 13.

APPLICATION ROOM
MAR 14 1910
U.S. PATENT OFFICE

RECEIVED
MAR 10 1910
Division 13, Paper No. 22
Amendment J& Oath.

Room 329
S.Z. de Ferranti
Serial No. 208034.
Filed May 14th, 1904.
Process for electrically welding turbine blades to their carrying elements.

To the Commissioner of Patents.

Sir,

This amendment is in reply to the Official action of January 4th, 1910.

A new Oath is filed herewith.

With regard to figures 12 and 13, the applicant believes that the hand-made drawing of these figures was filed with the amendment replying to the Office action of June 5th, 1908, and applicant would esteem it a favour if the Examiner would kindly ascertain whether the drawing has not been mislaid by the Office.

Cancel brief description with regard to figure 4^a directed to be entered on page 2, line 20.

never been added → Cancel figure 4^a.

The above figure was prepared in accordance with the Examiner's requirements as expressed in the Official letter of May 24th, 1909. As, however, the Examiner considers it now to be superfluous, the applicant has decided to withdraw this figure.

Claim 1, line 4, erase "limiting the heat conduction"

Line 5, erase "between" and insert therefor "partially isolating"

Line 5, erase "and relatively great mass" and insert therefor "from the remainder of the carrier"

Claim 2, line 6, after "rotor" insert "and enclosing the blade between clamps"

Erase claim 4.

With regard to these claims it is respectfully submitted that as now drafted they clearly differentiate the applicant's invention from that of Cowdery of record.

In the first place the applicant would point out that the arts of rake-making and turbine construction are not in any way allied to one another, so that even if the applicant's invention had been partially disclosed in an invention with regard to rakes, it could hardly be fair that a turbine constructor, now that the art has assumed such huge proportions, should be chargeable with the knowledge of an art so distantly related to the one upon which he is engaged.

In the second place, the applicant would point out that the problem which was presented for his solution in connection with the blading of rotors or stators in turbine manufacture, was not in any way analagous to that with which Cowdery was faced in making his rake. In the first place the cross-section of both parts of Cowdery's rake are practically identical, as the bar upon which the teeth are formed is of the same cross-section as the fork carrying the handle. The only interpretation which can be put upon the language used by Cowdery consistent with his disclosure appears to be, that the part carrying the teeth of the rake and the part carrying the fork were primarily raised to the welding temperature by the

electric current before being pressed together and welded. This is apparent and indisputable from the terminology used in lines 56 and 57 of Cowdery's specification.

Now, any construction put upon the present specification involving knowledge of the art developed after the date of Cowdery, would appear to be contrary to all the canons of construction in construing patent specifications. It must also be remembered that Cowdery's specification was filed in the year 1891, so that it cannot be presumed that the problem to be solved in connection with the union of parts by electric welding was too well understood. Further, Cowdery's description is very meagre and no diagram of the circuits proposed, or any full directions with regard to the same has been given in his specification. Had Cowdery shown the method in which he intended to apply the electric current for the purposes of uniting the parts together, then there would be no room for argument, but as his specification must be construed in the light of knowledge available at the date of his application, and as the construction of his specification points to a totally different process from that which the applicant uses, the disclosure in Cowdery ought not to be strained in order to prevent the applicant from obtaining protection for an invention which must be admitted is of paramount commercial importance.

The problem which the applicant had to solve was that of welding a blade to a rotor or other part of a turbine. It is well known that the blades involved are of exceedingly small mass in

comparison with that of the rotor, so that if the end of the blade were pressed against the rotor without any initial proportioning of its surface at the welding point, then the only result would be burning away from the blade. The applicant, however, in the course of his experiments and investigations foresaw that if an efficient weld was to be obtained then it was necessary that both parts involved should rise to the welding temperature. This result he was enabled to obtain, by partially isolating the welding part upon the larger mass, and as this partial isolation prevented the flow of heat from welding point by conduction, he was thus enabled to obtain an exceedingly good weld between the blade and the part carrying the same. In fact, so strong is the weld obtained by applicant's process, that the blades can be hammered over at right angles without the weld giving way.

In view of the fact that the present methods of fastening blades are exceedingly crude, and reliance is placed upon caulking and other old-fashioned methods of obtaining rigidity, it will be evident that the idea of forming the blades separately from the rotor while uniting them thereto in such a manner that they may be said to be practically integral therewith, is an invention of the highest importance. To an unprejudiced mind, such an advance in the art of turbine construction is one possessing great merit, and obviously the person introducing or inventing the same ought to have protection for his invention. Further, the applicant obtains this satisfactory weld not by clamping both pieces as is

done by Cowdery, but by differential treatment of the parts concerned in order to obtain the efficient result. As the conductivity of the larger mass such as the rotor, is so great that the heat is conducted rapidly away from the welding point, it was necessary that some means should be devised for retarding this flow of heat and localising it, so that the necessary temperature may be obtained. This, as has been stated above, was effected by the applicant by the partial isolation of the welded parts of the rotor, but when it comes to the treatment of the blade, the applicant increases its mass artificially by enclosing the blade with the exception of its tip in the clamping edges. By this means, it will be evident that the conductivities as regards heat of the two parts can be practically balanced, so that both portions will rise to the welding temperature at the same time. On the application of pressure interpenetration of the parts is effected, and an exceedingly good weld obtained of the blade to its carrying element.

The turbine constructor in search of a method of fastening the blades onto the rotor or stator as the case may be, could hardly be presumed to find in Cowdery the information with directions necessary to enable him to carry out the applicant's process, and invview of this fact as well as the fact of the extreme utility of the applicant's invention, it is hoped that the Examiner will now withdraw his rejection to these claims.

1258

Re-number claims 5 and 6 as 4 and 5.

Claim 4, line 4, erase "of at least"

Sub K' line 5, erase "two" and insert therefor "to a plurality"

Claim 5, line 5, after "to" insert " a plurality of"

Cancel claims 7, 8, 9, 10, 11, and 12.

An early allowance of the case is respectfully solicited.

Respectfully

S.Z. de Ferranti

By

Spear, Middleton, Donaldson & Spear

Attorneys.

WB/LW

APPLICATION ROOM
MAR 14 1910
U.S. PATENT OFFICE

1359

re UNITED STATES Patent application No. 208034 filed 14th May 1904, for "Process for electrically welding turbine blades to their carrying elements".

O A T H.

AMERICAN CONSULATE.
SHEFFIELD, England } ss:

Sebastian Ziani de Ferranti, the above named petitioner being sworn, deposes and says that he is a subject of the King of Great Britain and Ireland, and resident of Grindleford Bridge, Sheffield, in the County of York, England, (late of 31, Lyndhurst Road, Hampstead, London, N.W., England), that he verily believes himself to be the original first and sole inventor of the "Process for electrically welding turbine blades to their carrying elements" described and claimed in the specification to his application Serial No. 208034 filed 14th May 1904; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof or more than two years prior to this application, or patented in any country foreign to the United States on an application filed more than twelve months before this application, or in public use or on sale in the United States for more than two years prior to this application and that no application for Patent on said improvement has been filed by him or his representatives or assigns in any country foreign to the United States, except as follows:-

1264)

Great Britain, No. 11921/03 filed 25.5.1903.
AUSTRIA, application filed 20.5.1904.
GERMANY, application filed 21.5.1904.
BELGIUM, application filed 26.5.1904.
HUNGARY, application filed 28.5.1904.
FRANCE, application filed 31.5.1904.
RUSSIA, application filed 27/4.10/5.1905.
CANADA, application filed 23.5.1905.
JAPAN, application filed 9.6. 1905.
ITALY, application filed 27.7.1905.

Foreign Fee Stamp

C.N.D.

Sworn to and subscribed before me, this 3d day of March 1910 by Sebastian Ziani de Ferranti

Chas. N.Daniels

Consul of the United States of America.
Sheffield, England.

SEAL

APPLICATION ROOM
APR 14 1910
U.S. PATENT OFFICE

RECEIVED
APR 18 1910
Division 13, Paper No. 23
Amendment K.

1261

Room 107.

S. Z. de Ferranti.

Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Elements.

Filed May 14/04.

#208,034.

To the Commissioner of Patents:

Cancel lines 2 to 6 page 6 of amendment filed March 14th and substitute:-

Claim 4 lines 8 and 9 cancel "the blades to said carriers so prepared" and insert - each blade to a plurality of said rings -

Claim 5 line 5 after "rings" insert - each blade being welded to a plurality of rings -.

Respectfully,

S. Z. de Ferranti,

By-
Spear, Middleton, Donaldson & Spear.

Attys.

April 14, 1910.

REO

1262

Div. 13 Room 329 — 2-200 — Paper No. 24

Address only "The Commissioner of Patents, Washington, D.C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

AEW

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON D.C. Apr. 26. 1910.

MAILED

* * *

Sebastian Z. de Ferranti,

c/o Spear, Middleton, Donaldson & Spear,

Washington, D.C.

Please find below a communication from the EXAMINER in charge of your application.

#208,034. filed May 14, 1904. for "Process for Electrically Welding Turbine Blades to Their Carrying Elements".

E.B. Moore,

Commissioner of Patents.

6-311

Responding to amendments filed Mar. 14 and Apr. 14, 1910.

Applicant's argument has been fully considered, and action on the claims taken as follows:

Claim 1, 2 and 3 are each rejected on Coudery, taken with Eyre, of record.

Claim 4 (formerly considered allowable) is now believed to be met in the above references, and it is rejected on Coudery taken with Eyre.

Claim 5 is allowable.

In view of the fact that the examiner is satisfied that no patentable process is disclosed in this application, this action may be taken as final for purposes of appeal, if applicant so desire.

H.B.

G.A. Nixon

Examiner, Division 13.

APPLICATION ROOM
JUN 28 1910
U.S. PATENT OFFICE

RECEIVED
JUN 27 1910
Division 13, Paper No.25
Amendment L

Room 329
S. Z. de Ferranti.
"Turbine Blade Welding".
Filed May 14th, 1904.
Serial No. 208,034.

To the Commissioner of Patents.

Sir.

Reply to Office Letter dated April 26th, 1910.

It is very much regretted by Applicant and his Attorneys that the Examiner after having allowed claim 4 some twelve times or so during the last six years should now change his opinion and reject it. Neither are the reasons for such rejection understood, since Eyre of record does not appear to bear on the point covered in any way at all. The whole of Applicant's difficulties arose from the large mass of the carrier contrasted with the small mass of the blade. Circumferential grooving of the carrier was proved to be one good way of overcoming this difficulty. It is very respectfully pointed out that the problem above set forth never presented itself to Eyre since the bars he welds together are of equal cross section; neither is grooving of any kind employed by him.

Applicant, moreover, ventures to doubt whether even in the year 1910, the art of examining claims has reached a degree of precision sufficiently high to enable any distinction to be drawn between the patentability of the process and article respectively claimed in claims 4 and 5.

In this view he believes he is supported by

the opinion of the Examiner himself as expressed in the Office letter of December 16th, 1905.

The following statement appears therein:-

"Whether the invention is in the process or the article may be somewhat doubtful and for that reason it is believed to be proper to allow both claims in the same application."

For the above reasons, claim 4 is very respectfully resubmitted for reconsideration.

Claims 1 and 3 are also respectfully resubmitted on the ground that in order to meet the peculiar difficulties of the turbine blade welding problem, carrier and blade have to be treated differentially, the former having to have its mass produced and the latter having to have its mass virtually increased as by the copper blade clamps. No such differential treatment is to be found in any of the references.

Claim 2 is likewise resubmitted on the ground that the method of producing a bladed turbine rotor therein set forth is simple and less expensive than any hitherto practised inasmuch as the symmetry of the rotor being maintained throughout, the final step of balancing with lead can be successfully admitted. This advantageous omission arises solely from Applicant's novel process.

The feature of "symmetry" set forth in the preceding paragraph is indeed believed by applicant to be of such great practical importance that he requests that the following two claims dealing specifically with this point may be made of record:

It may be remarked parenthetically that it is

believed that claims on these lines were favourably entertained by the Examiner in an oral interview in the Spring of 1907 or thereabouts, but through some mischance, such claims do not appear to have been definitely submitted for action on the merits.

5 &. The method herein described of constructing a turbine wheel, ring or drum, the same consisting first in forming said wheel symmetrically in relation to its centre of rotation with the parts next to the welding points reduced to properly conform to the volume of the blades and electrically welding said blades at the said points whereby the symmetry of the wheel is maintained.

7. A turbine wheel, drum or ring having a periphery made to conform to the volume of the blades at the points of attachment of said blades and symmetrical in relation to the centre of rotation and a series of blades of uniform dimensions welded symmetrically to a plurality of said points, substantially as described.

Very Respectfully,

S.Z. de Ferranti,

By

Spear, Middleton, Donaldson & Spear.

ATTORNEYS.

RHG/LW.

1286

Div. 13. Paper 329

2-200

Paper No. 26

Address "The Commissioner of Patents, Washington, D. C." and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

HB

DEPARTMENT OF THE INTERIOR

ARV

UNITED STATES PATENT OFFICE

WASHINGTON, D.C. July 23, 1910.

MAILED.

Sebastian Z. de Ferranti,

C/o Spear, Middleton, Donaldson & Spear,

Washington, D.C.

Please find below a communication from the EXAMINER in charge of your application ~~this~~ your

Ser. No. 308,034, filed May 14, 1904, for "Process for Electrically Welding Turbine Blades to their Carrying Elements".

E.B. Moore,

Commissioner of Patents.

Responding to amendment filed June 25. 1910.

In specific reply to applicant's comment on the Eyre patent, it will be stated that this patent was cited to show the use of clamps which can not help but perform the same function as applicant's clamps which hold the turbine blades. In further consideration of this patent, in the middle of page 2 of the above amendment, applicant states that "no such differential treatment is to be found in any of the references". If in the Eyre device one of the pieces to be welded were so large that no clamp would be necessary, the other clamp would perform the function denied by applicant.

New claim 6 is rejected as drawn to an aggregation of the manner of forming the turbine wheel proper, and the specific method of attaching the blades. The examiner sees no reason for changing his action on the first four claims, and these are each rejected on Coudery taken with Eyre, of record.

Claim 5 and 7 are allowable.

H.B.

C.A. Nixon.

Examiner, Division 13.

APPLICATION ROOM
DEC 6 1910
U.S. PATENT OFFICE

RECEIVED
DEC 6 1910
Division 13, Paper No. 27
Amendment. M & Appearance

1237

Room 329.
S. Z. de Ferranti.
Process for electrically welding turbine blades to their carrying elements.
Serial No. 208034.
Filed May 14th. 1904.

To the Commissioner of Patents.

Sir,

This amendment is in reply to the Official letter of the 23rd July, 1910.

With regard to the specification of Eyre which the Examiner has relied upon in conjunction with Cowdery for the rejection of the applicant's claims, it is pointed out that the Examiner has evidently misunderstood the point of the applicant's last argument. The applicant has stated "that no such differential treatment is to be found in any of the references." in page 2 of the amendment filed June 25th, 1910, but the Examiner appears to think that if one of the pieces to be welded in the Eyre device was so large that no clamp would be necessary the other clamp would perform the function ~~served~~ desired by the applicant. To this the applicant would reply that supposing one of the parts being welded by the Eyre machine were so large as to render clamping unnecessary, then the problem would be such that some process similar to the applicant's would require to be proposed in order to effect the welding of one piece to the other. In Eyre's specification no suggestion is made of the manner in which articles differing largely in volume can be successfully welded together, and throughout the whole of the specification his attention is directed to the

welding together of practically identical pieces. The difficulty therefore, which Eyre encountered cannot be the same as the applicant's in which the whole problem was the manner in which a part of small volume like a turbine blade could be welded to a part of large volume, such as a rotor or stator. If welding were attempted as the Examiner suggests, by ~~applying~~ employing Eyre's machine, with one part in one clamp and the other part of such large dimensions as not to require a clamp, then ~~if it were attempted to weld them together~~ it would be found that the large volume of the larger piece would prevent any weld being formed owing to the difficulty in raising the parts to the welding temperature. This in short, was the difficulty with which the applicant was faced, and he overcame this difficulty by reducing the cross-section of the mass of larger volume to substantially the same volume as the part to which it is to be welded.

There is no suggestion in the whole specification of Eyre of reducing the cross-section of one of the parts to be welded at all.

With regard to Cowdery's specification, the applicant would point out that here there is disclosed a process of electric welding, but this process although bearing a ~~type of~~ resemblance to surface ~~resembling~~ the applicant's, in reality is not by any means so closely related as would seem at first sight. In the first place, the art to which Cowdery's specification relates, is that of making rakes, and the problem with which he was faced cannot be termed analogous to that with which the applicant was faced. Further, there is no suggestion in

Cowdery's specification that the heating effect of the current was due to the resistance at the contacting points of the two ~~pieces~~ parts, while from a perusal of the specification it would appear that each of the pieces were individually clamped between electrodes, so that the ohmic resistance of the parts between the electrodes was responsible for the raising of the temperature. In support of this view, attention is directed to line 51, in which it is stated: "In electric welding, the two pieces to be welded are suitably clamped in the terminals of a circuit carrying a current of large volume," and then in line 56, where it is stated that "the meeting surfaces of the pieces which have been heated to the welding heat by the current," are brought against each other." The inference then is that before actual contact of the parts takes place, they have been raised to the welding temperature. Now the only possible way in which this could be done by electric welding is certainly not by leading the current across the point of contact of the two pieces to be welded, as in that case they would have been brought together before their temperature started to rise.

Cowdery's specification, then, in view of these two extracts which the Applicant has selected, points to a method of electric welding entirely different from that which Applicant uses, & claims so that it would appear that the applicant's process is novel in view of both Eyre and Cowdery's specifications.

Further, when Cowdery's article is considered it will be evident that he was not faced with the same difficulty as the applicant, because the rake of Cowdery is naturally formed with a cross-section

similar to the fork to which it is attached, and that there was no partial isolation of the parts necessary in order to reduce the volumes of the metal at the welding point.

Again, in each of the specifications of Eyre and Cowdery, the use of two clamps one for each part to be welded, is insisted upon. The applicant, however, only uses one clamp for the blade and does not use one at all for the turbine carrying element, in fact, the difficulty of applying the process or the machine shown in either Cowdery or Eyre's specification, would consist in the fact that only one of the parts could possibly be held in a clmap, so that the fact of the applicant using only one clamp while prevented from the nature of his process from using the other, differentiates it to a great extent from either that disclosed in Eyre or Cowdery's specifications.

When it is considered that the art of turbine making has advanced with such rapid strides, the necessity of the discovering some way of uniting the blades to the rotor in an effective manner, would be accounted of exceeding importance. It is well known that the present method of fastening the blades of turbines totheir carrying elements is open to great improvement, as it is necessary to use caulking strips or some other antequated means for holding the blades in position. The ideal method of fastening blades is obviously to arrange matters so that they will practically form an integral part of the rotor or stator. This advantage the applicant believes he has been the first to accomplish as by electrically welding the blades to the carrier in the way in which he has disclosed in his

specification, a joint of great strength and efficiency is obtained. There is further not the slightest chance of the blades working loose during working of the turbine, as by means of his electric welding process, the applicant is enabled to fasten the blades to the rotor in such a manner that the blades may be bent over at right angles without in any way breaking or affecting the weld. When this fact is considered, it will be evident that the advantages of the applicant's process are very great.

To sum up the applicant's contention, Cowdery's specification he maintains does not show a process in which it is distinctly stated that the current is led across the point of contact of the two parts to be welded. Further, the arts of rake and turbine making are so far removed from one another that the transformation of a process suitable for making rakes into a process suitable for welding the turbine blades to their carrying elements might well evolve invention. Again, Eyre's specification discloses an electric process in which the current is led across the points of contact of the two parts to be welded, but in this case there is no solution of the problem disclosed of welding a part of small mass to a part of a relatively greater mass by partially isolating the parts of the greater mass at the welding spot to approximately the cross-section of the part to be attached thereto. Consequently, even in full possession of the knowledge disclosed in both Eyre's and Cowdery's specification, the applicant maintains that a person skilled in the art could not obtain possession of the applicant's process without some

~~employment of the inventive faculties.~~

Insert the following new claims:-

8. A process fo uniting two parts together consisting in utilising portions only of the individual juxtoposed surfaces for the transference of electric heating current so as to limit the heating effect of said current substantially to said portions and applying pressure so as to unite the parts by a weld of less area than that of the juxtaposed surfaces.

9. A process for uniting two parts together consisting in utilising portions only of the individual juxtaposed surfaces for the transference of an electric current the utilised portions being prepared so as to localise the heating effect of said current and applying pressure to unite the parts by a plurality of isolated electric welds.

10. A process for uniting two parts together consisting in leading an electric current across portions only of the individual juxtaposed surfaces of the parts and applying pressure to said parts so as to intergrally unite the individual juxtaposed surfaces together by a plurality of isolated electric welds.

11. A process for uniting two parts together consisting in forming projections on the individual juxtaposed surfaces of said parts leading an electric current across the parts by way of said projections and applying pressure to unite the individual juxtaposed surfaces by a plurality of isolated electric welds.

12. A metal article having component

employment of the inventive faculties.

In view also of the fact that the applicant is enabled to provide a process which has been desired for a long time, viz., to unite turbine blades to their carriers in a manner which is effective expeditious and inexpensive in practice, shows that the process disclosed by the applicant is of great utility.

In view of the above the applicant maintains that the claims rejected by the Examiner contain patentable subject matter and respectfully solicits a reconsideration of the rejected claims.

Please add the attached claims and attention is called to the remarks appended hereto.

Respectfully,

S.Z. de Ferranti,

By

Spear, Middleton, Donaldson, & Spear
per Walter Donaldson,

ATTORNEYS.

WB/LW.

parts thereof united by a weld of less area than that of the juxtaposed surfaces.

13. Composite metal articles having individual abutting portions united together by a plurality of isolated welds.

14. A metal article having a plurality of current localising portions formed on one of its surfaces.

The above new claims are submitted to the Examiner's consideration as being patentable over the state of the art disclosed by the results of the Official search. The above claims are clearly differentiated from the process disclosed in Cowdery's patent of record. In Cowdery's specification, in an article produced in accordance with the directions given therein, the weld between the parts is spread over the whole of the individual abutting portions, the parts a', being the individual portions of the head A which abut against similar parts of the braces B. In this process, therefore, the whole of the opposing surfaces are operative in conducting the heating current and the whole of the abutting portions are available for welding purposes. This means when the cross-section becomes large, that a much greater amount of current is utilised in uniting the parts than is absolutely necessary, as by utilising the applicant's process if the current is restricted to definite portions of the abutting surfaces then the parts will be united together by a plurality of isolated welds, which for all practical purposes is strong enough to withstand ordinary conditions of working.

In proof of this, the applicant finds that when welding turbine blades to their carrying elements by the method which he has disclosed in this specification the blades may be hammered over at right angles without any signs of the weld giving way. The applicant, therefore, utiliges only a portion of the area which might be utilised for welding, and thus by limiting the amount of cross-sectional area available for the conduction of the current, the heating effect of the same is localized and the amount of corrent required for the weld reduced to the absolute minimum. This process has not been disclosed in any of the specifications cited by the Examiner, and consequently the applicant respectfully submits that the new claims embody patentable subject matter. The process so far as the applicant knows, is novel. The parts are united together in an exceedingly efficient manner. Further, the amount of current is reduced to the bare minimum requisite for enabling the desired strength of weld to be obtained, and in view of this fact the amount of current used and the expense of each weld is reduced to the absolute minimum.

In view of these advantages the applicant very respectfully requests a reconsideration of the case, and hopes that it will soon pass to an early allowance.

Respectfully,

S.Z.de Ferranti,

By Spear, Middleton, Donaldson & Spear.
per Walter Donaldson.

ATTORNEYS.

1276

APPLICATION ROOM
DEC 5 1910
U.S. PATENT OFFICE

To the Commissioner of Patents:

Please enter the appearance of the undersigned in the accompanying case.

Ellis Spear

F. L. Middleton

Walter Donaldson

James M. Spear

Div. 13 Ho... 329

Address only The Commissioner of Patents, Washington, D. C., and not any official by name.

2-200

Paper No. 28

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

HB/BWT

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON January 6, 1911.

MAILED

Sebastian Ziani de Ferranti,

C/o Spear, Middleton, Donaldson & Spear,

Washington, D.C.

Please find below a communication from the EXAMINER in charge of ~~the~~ your application ~~of~~.

208,034, filed May 14, 1904, for Process for Electrically Welding Turbine Blades to their Carrying Elements.

E.B. Moore.

Commissioner of Patents.

6-321

In response to amendment filed Dec. 5, 1910.

Concerning the argument made by applicant especially the sentence beginning in line 15, page 2, of the above paper, the subject matter of this sentence is shown to be old in Coudery, of record.

Claims 1 to 4 and claim 6 are each rejected in accordance with the Office letter of July 23, 1910.

New claims 8, 9 and 10 are each drawn to a method of electric welding and constitute a shifting of ground. They are therefore required to be canceled under ex parte Selle, 110 O.G 1728.

Claims 8 and 9 are additionally rejected as incomplete since they omit the step of heating.

Claims 8 to 14 are each rejected on Coudery and also on Moxham, of record.

Claims 12, 13 and 14 are each also rejected on DeFerranti, of record.

Claims 5 and 7 are believed to be allowable.

It is obvious that a clear issue has been raised between applicant and the examiner and the case should be prosecuted to an early final issue.

H.B.

C.A. Nixon,
Examiner, Division 13.

1278

RECEIVED

DEC 19 1911

Division 13, paper No. 29

Room 329.
Sebastian Ziani de Ferranti
Serial No. 208034.
Filed May 14th, 1904.
Process for electrically welding turbine blades to their carrying elements.

Amendment. N

APPLICATION ROOM
DEC 18 1911
U. S. PATENT OFFICE

To the Commissioner of Patents.

Sir,

This amendment is in reply to the Official letter of January 6th, 1911.

With regard to the first paragraph of the Official letter in which the Examiner takes objection to certain parts of the argument filed on the 5th December, 1910, the applicant would point out that the paragraph referred to simply states the problem with which the applicant was confronted. Further, he was pointing out the difference between his process and that described by Eyre of record, and the difference between the applicant's process and that of Eyre is stated to be that in Eyre the problem was for uniting two pieces of the same cross-section, while the applicant had to unite two pieces of greatly differing masses. The Examiner states that this is old as shown in Cowdery's specification; the applicant, however, does not agree that his process is disclosed in Cowdery's specification, and the difference of the masses dealt with by the applicant are very much greater than the difference in the masses dealt with by Cowdery.

Applicant admits that Cowdery states in his specification that the object of the particular method which he employs is for the purpose of forming welds between the heads and the braces, without

heating the entire head. If it is assumed that the difficulties of Cowdery and the applicant are the same, yet it does not necessarily follow that the particular methods in which the difficulty was over come are indentical. Further, if it is assumed that the difficulties encountered in both are indentical, then there may also be subject matter in two different solutions for overcoming the same difficulty, so long as the methods of solution are not the same.

The question therefore comes to be whether the process disclosed in Cowdery's application is identical with that which the applicant has disclosed. The applicant must emphatically state that Cowdery's method is essentially different from his.

On a fair construction of Cowdery's specification, no other interpretation can be put upon the document than that the parts to be united are first brought separately to the welding point before pressure is applied, so that in forming a rake according to Cowdery's specification, two distinct operations are necessary, first by means of an electric current to place the ends to be united between clamps, raising each of the parts individually to the welding temperature, and then forcing them together to form the weld. In the applicant's process, however, the method of procedure is entirely changed, and both the operation of heating and forcing together under pressure are performed simultaneously. Further, in the applicant's process, no clamps are necessary and the current being led across the points of contact of the two parts to be united, allows the parts to be forced together whenever they have

softened under the influence of heat to the required extent. It is therefore submitted that this essential difference exists between Cowdery's process and the applicant's viz., that in Cowdery's process the parts to be united are separately raised to the welding temperature before being forced together under pressure, while in the applicant's process the operations of heating and forcing together take place simultaneously. It is thought that this difference is sufficient evidence of the inventive faculties having been exercised, and raises the method of Ferranti apart from commercial considerations whatever, to the dignity of invention.

Erase claims 8 to 14.

Respectfully,

Sebastian Ziani de Ferranti,

By- Spear Middleton Donaldson & Spear

Attys.

December 16, 1911.

HMB

1281

Div. 3 E m 175
Address only "The Commissioner of Patents, Washington, D. C."

2—260

Paper No. 30
All communications respecting this application should give the serial number, date of filing, and title of invention.

WLR/RAJ

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE
WASHINGTON Jan. 20, 1912.
" " "
MAILED.

S. Z. de Ferranti,

Care Spear, Middleton, Donaldson and Spear,

City.

Please find below a communication from the EXAMINER in charge of your *application*
208, 034, filed May 14, 1904----

Process for Electrically Welding etc.

E. B. Moore.
Commissioner of Patents.

Replying to amendment filed Dec. 18, 1912.

This case has been transferred to Division 3 and a farther search has disclosed the patent to Thomson, 487, 302, Dec. 6, 1892, 219 - 10, Fig. 4 of which is considered to anticipate claims 1 and 2.

Claims 3 and 4 are considered allowable.

Claims 5 and 7 are for an article independent of the process of manufacture and of a recongnized different art. Division is therefore required between claims 5 and 7 and the remaining claims. It is not clear, however, why these claims are not barred to applicant in this application on account of his patent # 874, 398, Dec. 24, 1907, Steam Engines, Rotary. There seems to be no line of division between the claims in that case and claims 5 and 7.

Claims 6, as stated in the last Office letter is still considered to be merely an aggregation of independment steps since the details of broadly forming a balanced body or carrier has no relation to the specific welding steps. This claim is rejected upon the ground of being an aggregation of independent steps. The steps of balancing the body and symmetrically arranging the welding points is considered to be

merely mechanical skill.

It is noted that the amendment to page 3 (Apl. 30, 1909) is not inserted at the right place, "and" should have been inserted at the end of line 9 and the description of Fig. 12 and 13 should stand between line 9 and 10. Applicant's attention is also called to the fact that no figures 12 and 13 agreeing with the description at this place and that inserted on page 5, xx between lines 17 and 18 have ever been inserted in the drawings. This is considered necessary in order to support the limitations to claims 1 and 2 and the statement inserted at the end of the specification by amendment of Apl. 19, 1907,

The objection as to the drawings being photolithographs, still applies.

Wm J Rich,

Examiner, Div. 3.

W. R.

APPLICATION ROOM
DEC 30 1912
U. S. PATENT OFFICE

Serial No 208034

Paper No. 31

Amendment C

U. S. PATENT OFFICE,
DEC 31 1912
DIV. 3.

Room 175.
S. Z. de Ferranti.
Serial No. 208034.
Filed May 14th, 1904.
"PROCESS FOR ELECTRICALLY WELDING &c."

To the Commissioner of Patents.

Sir,

This amendment is in reply to the Official letter of January 20th, 1912.

With reference to the U. S. Patent to Thomson, No. 487302, which the Examiner considers anticipates claims 1 and 2, the applicant, after careful consideration of the specification and drawings of the above patent, cannot agree with this view of the Examiner.

In Thomson's specification a method of electric welding is described and illustrated by means of drawings and the whole of the description and the drawings relate to a process of attaching parts of different mass together by electric welding. On page 1, line 45, the following statement occurs: "The present invention consists in uniting pieces in such a manner that a greater current passes through one piece than through another or others concerned in the operation, whereby if the one piece be larger than the other it may reach the welding temperature at the same time as the others."

In the whole of the methods illustrated, Thomson effects the welding together of two pieces of different mass, by passing a greater current through the part of larger mass than that which passes through the smaller mass.

In Figure 4 to which the Examiner especially draws the Applicant's attention, the larger mass, B, is shown

which is provided with two small projections, J and J', to which the small pieces, a and b, are welded respectively. In this method it is stated on Page 2, line 103, that the arrangement for the supply of the current to the pieces between the clamps, are to be made on the same principles as set forth in connection with Figures 1 and 2, the object being to traverse the larger piece by a larger amount of current than the smaller piece, whereby the heating operation in each goes on proportionately.

In the only example which Thomson shows of uniting a larger mass to a single smaller mass, he effects this as described with reference to Page 2, at lines 30-39, by utilising a third piece for the purpose of increasing the current passing through the larger piece, so as to raise the pieces to be welded to the desired temperature, and it is evident that as this principle is also to be applied when welding, in Figure 4 for example, the part, a to the part B, it would be necessary to apply a current through the part, b, initially and temporarily for the purpose of raising the parts, B and a, to the desired welding temperature. Also in claim 1, he has stated as the subject matter of his invention, the herein described improvement in welding metals electrically consisting in making contact with both the pieces to be united and passing a current of greater strength through one piece than the other.

Taking Thomson's specification as a whole, it is evident that the only method which he has disclosed of welding parts of different mass together, is to pass a greater current through the larger mass than through the smaller one. In no case has he disclosed a method like the applicant's, in which the same current passes through

both masses being welded.

In all cases where Thomson desires to weld two parts together, of different mass, he applies current through a third part to the larger mass in the initial stages of the operation, in order to heat the parts proportionately. In no case is there the slightest suggestion in Thomson's process of welding two parts of different mass together, without the aid of a supplementary piece to pass a greater current through the larger piece than the smaller piece.

In order to clearly differentiate the applicant's claim from Thomson of record, the applicant makes the following amendments to claims 1 and 2:

Claim 1, line 9, before "electric" insert "and uniform"

Claim 2, line 8, before "electric" insert uniform"

It is submitted that these amendments clearly differentiate the applicant's process from that described in Thomson's specification.

Cancel claims 5 and 7, and re-number claim 6 as claim 5.

The applicant cannot agree with reference to claim 6, that this claim is merely an aggregation of independent steps. In the construction of rotors, it is well-known, that one of the most important parts is the balancing of the rotor, as if the centre of mass does not coincide with the centre of rotation, then vibrations of greater magnitude will be set up owing to the speed at which the rotor revolves.

In the present construction of rotors, after all the blades have been attached, it is necessary to balance the rotor by drilling holes in the required positions, so as to remove excess of metal at these parts, so that according to the ordinary construction, the

procedure is to form the rotor first and thereafter to make its mass symmetrical by removing metal at the necessary positions. This method of balancing is at best only approximate, while it also requires the exercise of much skill and ingenuity to determine the precise spot from which the metal ought to be removed to give the best results. According to the applicant's process, however, the rotor is formed symmetrical at the commencement, and as the blades are all equal to one another, and symmetrically disposed with regard to the axis of ~~the casting~~ rotation, it will be evident that ~~the~~ a considerable expenditure of skill and time is prevented by the applicant's invention.

The applicant considers that the welding of blades on to the body has a certain relationship with the balancing the same, in view of the fact to which the rotor is applied, as the removal of the metal for the purpose of welding is effected in such a manner as to leave the rotor absolutely symmetrical, after the parts have been removed by the welding operation.

In view of the above, a reconsideration of this claim is respectfully requested.

With regard to the amendment of April 30th, 1909, page 3, insert "and" at the end of line 9, and the description of Figures 12 and 13 between lines 9 and 10. A drawing containing new Figures 12 and 13 is filed herewith.

The objections to the drawings are being complied with, bur it is reapectfully requested that those at present on file be allowed for examination purposes.

A new set of hand-made drawings will be filed before issue of the case.

An early allowance on the case is respectfully requested.

Respectfully,

S. Z. de Ferranti.

by

Spear Middleton, Donaldson & Spear

ATTORNEYS.

WB/LW.

1268

Div. 3 Room 175 — 2-260 — Paper No. 32

Address only "The Commissioner of Patents, Washington, D. C." — All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

WLR/RAJ

UNITED STATES PATENT OFFICE

WASHINGTON Jan. 18, 1913

MAILED.

S. Z. de Ferranti,

C/o Spear, Middleton, Donaldson and Spear,

City.

Please find below a communication from the EXAMINER in charge of your application

208, 034, filed May 14, 1914,

Process for Electrically Welding etc.

E. B. Moore,

Commissioner of Patents.

Replying to amendment filed Dec. 30, 1912.

The amendments to claim 1 and 2 do not apply, the term "electric" not being found in lines 9 and 8, respectively, these claims.

Since claims 5 and 7, for the article, have been canceled the title in the preamble should be amended.

Applicant's remarks fail to point out any alleged relationship between the steps of balancing the rotor and welding blades thereto. It seems to be obvious that the rotor can be balanced, either before or after attaching the blades, Claim 5 is again rejected for this reason.

Applicant states that substitute drawings will be filed but the Office practice has been changed so that it is desirable to correct the present drwings rather than to file new ones. No action can be made upon claims 2 and 3 in view of the fact that the amendments do not apply.

Wm J Rich

Examiner. Div. 2.

W. R.

APPLICATION ROOM
DEC 29 1913
U. S. PATENT OFFICE

APPLICATION ROOM
DEC 27 1913
U. S. PATENT OFFICE

Serial No 208034

Paper No. 33

Amendment P

8978

Room 329.
S. Z. de Ferranti.
Process and Apparatus for Electrically Welding Turbine Blades Etc.
Filed May 14, 1904.
#208, 034.

U. S. PATENT OFFICE
DEC 31 1913
DIV, 3

To the Commissioner of Patents:-

Responsive to office action of January 18, 1913 in this case, please amend as follows:-

In amendments to claims 1 and 2, the line should have been 7 instead of 9 and 8 respectively. In order to avoid confusion the claims 1 and 2 are herein given as it is desired they should now read.

1. The method of attaching turbine blades to their carrier of relatively great mass which consists in adjusting the heat capacity of the localized area of the carrier at the point of attachment by partially isolating these areas from the remainder of the carrier so that a welding temperature may be reached notwithstanding the cooling effect of the mass of the carrier, and passing a uniform electric heating current directly through the carrier and by way of the clamps through the blades to weld the blades in succession to the carrier, substantially as described.

2. The method of attaching turbine blades to their rotor carrying elements one by one, consisting in equalizing the heat capacity of the welding parts by limiting the conducting areas of the carrier at the points of blade attachment symmetrically in relation to the axis of rotation of the motor, and enclosing the blades between clamps so that on heating locally by a uniform electric current, the blades

and carrier rise to approximately the same temperature on welding the blades to the carrier so prepared, substantially as described.

Change the title to --Process for Electrically Welding Turbine Blades--.

The Office will be asked to correct the drawings.

Applicant trusts that after this amendment has been made claims 1 and 2 in view of the argument last filed will be found to be acceptable and will be allowed.

With regard to the remark by the Examiner that no relationship exists between the step of balancing the rotor and welding the blades thereto, it is submitted that it appears to us that such a relationship exists, as by the method which the applicant discloses of attaching the turbine blades to their carrying elements, the symmetry of the rotor is preserved.

It is quite true, as the Examiner remarks, that the rotor may be balanced either before or after attaching the blades, but in the present case both these operations are dispensed with, as owing to the fact of the blades being spaced symmetrically round the circumference of the motor, the symmetrical disposition of the masses is preserved, and the balancing operation previously required in the manufacture of rotors, dispensed with.

Respectfully,

S. Z. de Ferranti,

By-Spear Middleton Donaldson & Spear

Attys.

Dec. 24, 1913.

AM/HLA.

Form 3 Rev. 179

Address "The Commissioner of Patents, Washington, D. C." and not any official by name.

2-280

Paper No. 34

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

WLR/RAJ

UNITED STATES PATENT OFFICE

WASHINGTON Jan 10, 1914.

MAILED.

Spear, Middleton, Donaldson and Spear,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of the application of

S. Z de Ferranti, Process for Electrically Welding etc

208,034, filed May 14, 1904.

Thomas Ewing
Commissioner of Patents.

Replying to amendment filed Dec. 29, 1913.

Claim 5 will be allowed over the references formerly cited and the case now awaits the required corrections of the drawing.

Wm J Rich

Examiner. Div. 3.

W. R.

1202

Serial No. 208034

Paper No. 35 Letter

PRINTED LETTER HEAD OMITTED.

MAIL ROOM
DEC 5 1914
U. S. PATENT OFFICE

Washington, D. C. December 4, 1914.

U. S. PATENT OFFICE.
DEC 19 1914
DIV. 3

ACCOUNT

To the Commissioner of Patents,

Washington, D. C.

Sir:

Please correct the drawings in the case of Sebastian Z. de Ferranti, Filed May 14, 1904, Serial No. 208, 034, for improvement in Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Element, as per requirements of the Examiner in the last Office letter, charging the cost of the same to our account. Please advise us as soon as the drawings have been corrected and the cost thereof.

Very respectfully,

Spear Middleton Donaldson & Spear

HMB

Spear, Middleton. et al C

U. S. PATENT OFFICE

NUMBER

257189

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DEC 5 1914
CHIEF CLERK

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ACCOUNT

BOOK 124 PAGE 33 DIV. E

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CORRECTION ORDERED

DEC 12 1914

CORRECTED DEC 18 1914

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BOOK 257 PAGE 122 DIV C

FOR DIV. 3

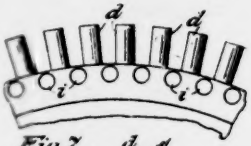


Fig. 7.



Fig. 4.



Fig. 8a



Fig. 9a

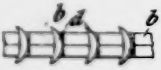


Fig. 10a.

INVENTOR
SEBASTIAN Z. DE FERRANTI

ATTEST.
Edmund Barker

By Lyon Mallett & Barker ATTYS

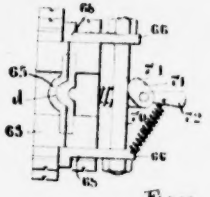


Fig. 12.

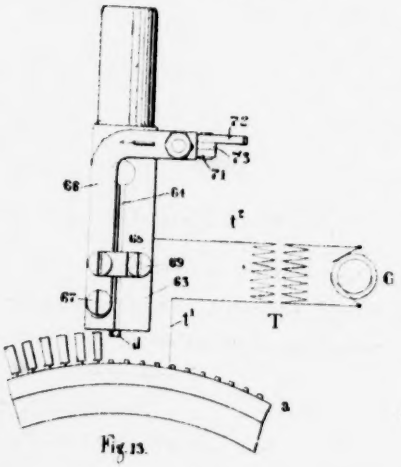


Fig. 13.

WITNESSES

INVENTOR
BY
ATTORNEY

1296

Serial No. 208034

Paper No. 36 Letter

APPLICATION ROOM
DEC 24 1914
U. S. PATENT OFFICE

U. S. PATENT OFFICE
DEC 26 1914
DIV. 3

Room 329.

Sebastian Z. de Ferranti.
Process and Apparatus for
Electrically Welding Turbine
Blades to their Carrying
Element.
Filed May 14, 1904.
#208, 034.

To the Commissioner of Patents:

We are informed by the Office that the drawings in the above case have been corrected, and as this places the case in condition for allowance early issue will be appreciated.

Respectfully,

Sebastian Z. de Ferranti,

By- Spear Middleton Donaldson & Spear

Attys.

December 23, 1914.

HDC

1297

Serial No. 208034

Paper No. 37 Letter.

APPLICATION ROOM
DEC 29 1914
U. S. PATENT OFFICE

U. S. PATENT OFFICE
DEC 29 1914
DIV. 3

Room 329.

S. Z. de Ferranti.

Process and Apparatus for Electrically Welding Turbine Blades to their Carrying Element.

Filed May 14, 1904.

Serial Number 208, 034.

Hon. Commissioner of Patents:

Please cancel sheet 2 of the drawings as Figures 4, 7, 8, 9, and 10 contained on this sheet have been transferred to sheet 4.

Respectfully,

S. Z. de Ferranti.

By- Spear Middleton Donaldson & Spear

Attys.

December 28, 1914.

JMS/BIB.

1298

ADDRESS ONLY
THE COMMISSIONER OF PATENTS,
WASHINGTON, D. C.

2—181 A. T. D. **Serial No.** 208034

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON Dec. 31, 1914.

Sebastian Ziani de Ferianti,

Sir: Your APPLICATION for a patent for an IMPROVEMENT in Process for Electrically Welding Turbine Blades,

filed May 14, 1904, has been examined and ALLOWED.

The final fee, TWENTY DOLLARS, must be paid not later than SIX MONTHS from the date of this present notice of allowance. If the final fee be not paid within that period, the patent on this application will be withheld, unless renewed with an additional fee of $15, under the provisions of Section 4897, Revised Statutes.

The office delivers patents upon the day of their date, and on which their term begins to run. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will require about four weeks, and such work will not be undertaken until after payment of the necessary fee.

When you send the final fee you will also send, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR, TITLE OF INVENTION, AND SERIAL NUMBER AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If you desire to have the patent issue to ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of FIVE CENTS EACH. The money should accompany the order. Postage stamps will not be received.

Final fees will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

Respectfully,

Thomas Ewing
Commissioner of Patents.

Spear, Middleton, Donaldson & Spear,

Washington, D. C.

IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

2-327.

1309

MEMORANDUM

OF

FEE PAID AT UNITED STATES PATENT OFFICE.

$20 REC'D
D JUN 30 1915

C.C. U.S. PAT. OFFICE

(Be careful to give correct Serial No.)

Serial No. 208034

INVENTOR: , *1915*

Sebastian Z deFerranti

PATENT TO BE ISSUED TO

NAME OF INVENTION, AS ALLOWED:

Process and apparatus for electrically welding turbine blades to their carrying element

DATE OF PAYMENT:

June 30/15

FEE:

$ 20

DATE OF FILING:

May 14/04

DATE OF CIRCULAR OF ALLOWANCE:

Dec 31/1914

The Commissioner of Patents will please apply the accompanying fee as indicated above.

Spear, Middleton Donaldson & Spear

Attorney.

SEND PATENT TO

Attys

6-1916

1,309

S. Z. DE FERRANTI.

PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221.

Patented July 27, 1915.

3 SHEETS—SHEET 1.



Fig. 2.

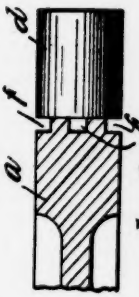


Fig. 3a.



Fig. 6.

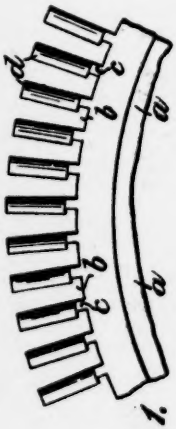


Fig. 1.



Fig. 1a.



Fig. 3.



Fig. 5.

ATTEST
Edward Sarton

INVENTOR
SEBASTIAN Z. DE FERRANTI.

By Spear, Middleton, Donaldson & Spear Attys.

S. Z. DE FERRANTI.

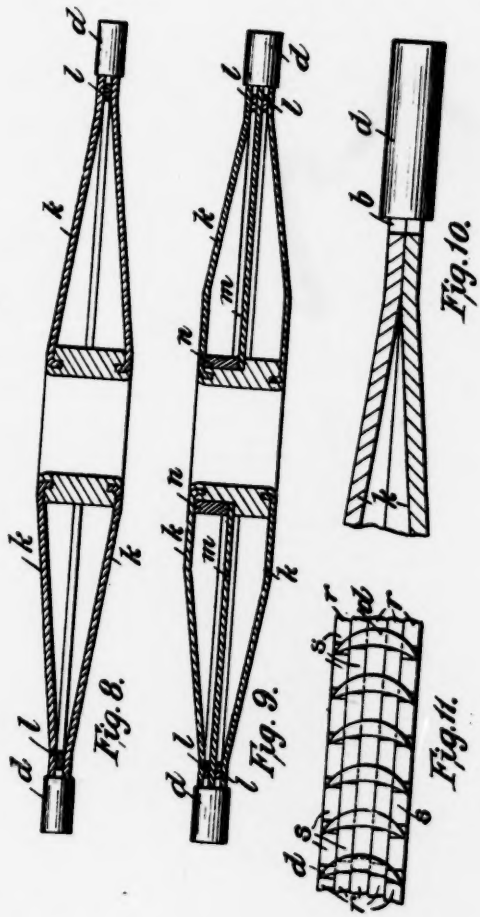
PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221.

Patented July 27, 1915.

3 SHEETS—SHEET 2.



ATTEST:
C. Middleton
Edward Sarton

INVENTOR
SEBASTIAN Z. DE FERRANTI
BY Spear, Middleton, Donaldson & Spear
ATT'YS

S. Z. DE FERRANTI.

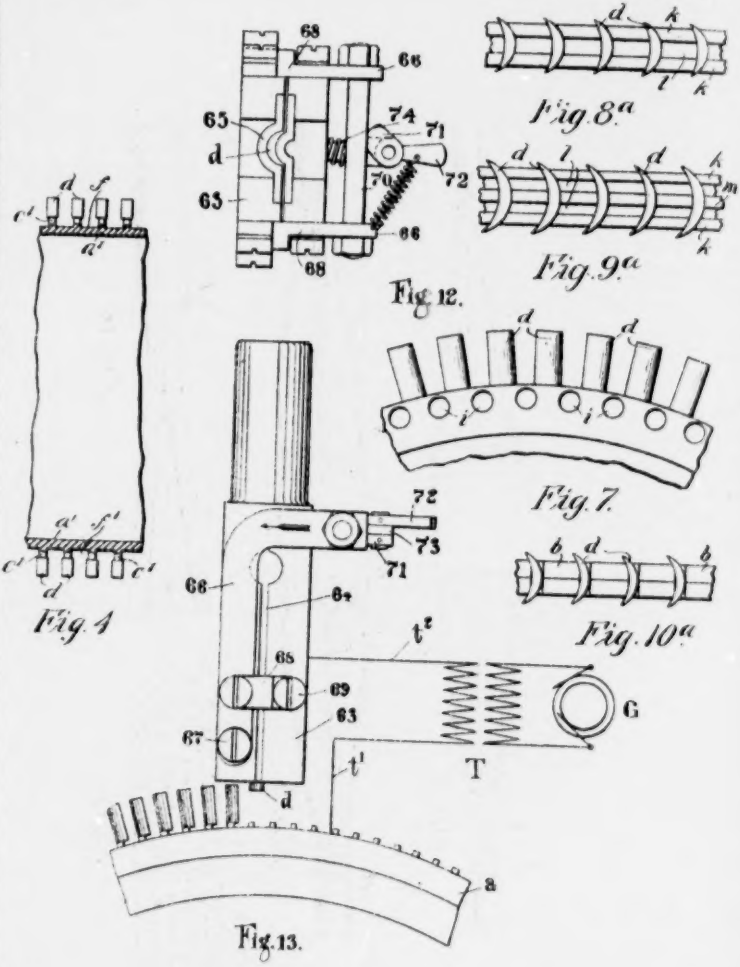
PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221.

Patented July 27, 1915.

3 SHEETS—SHEET 3.



WITNESSES

H. M. Barrett

H. L. Aiden

INVENTOR

Sebastian Z. de Ferranti

BY

Spear, Middleton, Donaldson & Spear

ATTORNEYS

UNITED STATES PATENT OFFICE.

SEBASTIAN ZIANI DE FERRANTI, OF HAMPSTEAD, LONDON, ENGLAND.

PROCESS FOR ELECTRICALLY WELDING TURBINE-BLADES.

1,148,221. Specification of Letters Patent. Patented July 27, 1915.

Application filed May 14, 1904. Serial No. 208,034.

To all whom it may concern:

Be it known that I, SEBASTIAN ZIANI DE FERRANTI, a subject of the King of Great Britain and Ireland, and residing at 31 Lyndhurst road, Hampstead, London, N. W., England, have invented a certain new and useful Process for Electrically Welding Turbine-Blades, of which the following is a specification.

The invention relates to the electrical welding of turbine blades on to the wheels, rings or drums carrying them and has for its object to overcome the difficulties which have been experienced in electrically welding together two such parts differing considerably as regards their power of rising to the required welding temperature when heated at the point of junction, so that blade carrying elements with welded blades may be reliably produced in an inexpensive manner.

The main difficulty arises through the blades and their carriers differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the carrier to which it is to be secured, it is found that the comparatively large volume of metal forming the carrier, rapidly conducts heat away from the welding point thus preventing the temperature of the carrier rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of the blade carrying element in the neighborhood of the welding point so that approximately equal heating occurs in both faces to be welded.

Referring to the accompanying drawings which, with the exception of Figure 4, show the invention applied, by way of example, to a type of parallel flow turbine in which the blades are mounted on the edge of a wheel like body, Fig. 1 is a part side elevation of such a wheel having cross grooves, Fig. 1ª being an edge view; Fig. 2 shows a similar edge view of a modification in which sets of intersecting grooves are adopted; Fig. 3 shows an edge view of a form having circumferential grooves, Fig. 3ª being a section on the line A A of Fig. 3; Fig. 4 shows, in longitudinal sectional elevation, part of a drum carrier to which the blades are welded in accordance with one form of the invention; Figs. 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disk, while Fig. 7 is a part side elevation in which holes are bored through from face to face of the disk; Fig. 8 shows a sectional plan of a form of wheel built up of two dished disks, held apart at their circumferential portions by distance pieces, Fig. 8ª being a partial edge view to a larger scale; Fig. 9 is a similar sectional plan of a modified form of wheel built up of three disks, while Fig. 9ª is a corresponding partial edge view also to a larger scale; Fig. 10 shows a part sectional elevation of a wheel built up of two comparatively thick disks having notched edges, Fig. 10ª being a partial edge view, while Fig. 11 shows an edge view of a form of wheel built up of a series of "stepped" laminæ and Figs. 12 and 13 show a form of clamp and a diagram of the electrical connections.

(It will be seen that all the edge views in the preceding figures are shown as developments for clearness of drawing and not as true projections.)

The same reference symbols are, when possible, used in the accompanying drawings to denote similar parts.

In carrying out the invention according to the form shown in Figs. 1 and 1ª, the turbine wheel or disk is shown at *a*, cross grooves, *b*, being cut in its circumferential edge so as to leave projecting portions of metal, *c*, to which the turbine blades, *d*, are welded. The same object is attained by cutting two intersecting sets of grooves, *e*, in the edge of the disk, as is shown in Fig. 2 or by cutting circumferential grooves, such as *f*, completely around the edge (see Figs. 3 and 3ª.)

Fig. 4 shows the invention according to one form applied to the case of a drum blade carrier, *a'*; the drum is grooved circumferentially with grooves, *f'*, the intervening collars of metal being then cross-cut to form projecting teeth, *c'*, on which the blades are welded.

According to a modified form, radial holes, *h*, may be bored a short distance into the edge of the disk, these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in Fig. 5, or arranged without particular reference to the position of the blades, (see Fig. 6).

In Fig. 7, a method is shown of removing

metal in the neighborhood of the welding point by boring holes, *i*, through (or partly through) from face to face of the disk at a radius slightly less than that of its outside edge. The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficient areas untouched to insure the mechanical strength in the welded joint.

Referring now to Figs. 8 and 8ª, a form of wheel is shown somewhat diagrammatically which is built up of two dished disks, *k*, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces such as *l*, disposed at a radius somewhat less than the maximum radius of the disks, the blades, *d*, being welded in position on their outside edges.

Figs. 9 and 9ª show a type of wheel generally similar to that last described but having an intermediate plane disk, *m*, in addition to the two dished disks, *k*; a portion, *n*, of the hub, *o*, is in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, *l*, are indicated as before but any other convenient method of holding the disks in their correct relative position may be adopted.

In every case it will be seen that those portions of the carrier to which the blades are to be welded are partially isolated from the body of the carrier by slots, holes and so forth so as to limit the cross-sectional area available for the conduction of heat, and so compel the carrier to rise to the welding temperature. On the other hand to prevent the blades being burnt away, their mass is artificially increased by holding them between clamps or jaws of high heat conductive material such as copper. Thus referring to Figs. 12 and 13, the jaw holder 63, is separated into two branches by means of the slot, 64, each branch carrying a copper jaw, 65, shaped so as to clear adjacent blades. Between the jaws, 65, the blade to be welded is clamped, so as to leave the tip only exposed as seen in Fig. 13, and in order to insure a good contact and rigid holding of the blade in the jaws, a clamping device is preferably arranged in addition to that provided by the spring of the two branches of the jaw holder.

According to the form shown links, 66, are pivoted at 67, to one branch of the jaw holder, while short cross links, 68, connect the links, 66, to the other branch to which they are pivoted at 69. The long links, 66, are curved as shown, and are connected at their non-pivoted ends by the cross-piece, 70, to which pressure to clamp the blade is applied in the direction of the arrow (see Fig. 13) by means of the cam, 71, and the hand lever, 72, both of which are secured to a common axle rotatably mounted on any convenient support, 73. A spring such as 74, serves to return the links when the blade is released.

The necessary electrical connections to affect the welding are shown diagrammatically in Fig. 13, in which G represents an appropriate source of alternating current, and T, a transformer. It will be seen that while the lead, *t'*, may be connected directly to the carrier *a*, as in the example shown, it is necessary on the other hand that current to the blade, *d*, should be conveyed indirectly by way of the jaw holder, 63, and lead, *t²*.

In Figs. 8 and 9, the dished disks, *k*, are indicated as secured to the hubs, *o*, by pressing the inner edges of these disks into grooves and subsequently burring over the hubs to hold the disks in place.

In the modification shown in Figs. 10 and 10ª, two dished disks, *k*, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, *b*, being cut in their edges in accordance with the method described above with reference to Figs. 1 and 1ª. Again, that portion of the disk carrying the blades may be built up of a set of thin laminæ, *r* (see Fig. 11) the edges of which are notched as at *s*, the laminæ being assembled in such a way that the notches, *s*, are "stepped" with regard to each other, so that the intervening projections of metal may follow the shape of the turbine blades to be welded to them.

Instead of notching the laminæ, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

In an invention such as the present, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the scope is sufficiently indicated by the many examples given above and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described above by way of example.

The electric heating current is passed directly through the carrier and by way of clamps through the blades.

By means of my invention it will be seen that the blades are attached to their carrying elements in an expeditious and efficient manner while in the case of rotors a still further advantage is obtained over the methods of blading commonly employed inasmuch as if properly carried out the attachment of the blades by electric welding introduces no change of symmetry with respect to the axis of rotation and consequently dispenses with the tedious operation of balancing otherwise rendered necessary.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. The method of attaching turbine blades to their carrier of relatively great mass which consists in adjusting the heat capacity of the localized area of the carrier at the point of attachment by partially isolating these areas from the remainder of the carrier so that a welding temperature may be reached notwithstanding the cooling effect of the mass of the carrier, and passing a uniform electric heating current directly through the carrier and by way of the clamps through the blades to weld the blades in succession to the carrier, substantially as described.

2. The method of attaching turbine blades to their rotor carrying elements one by one, consisting in equalizing the heat capacity of the welding parts by limiting the conducting areas of the carrier at the points of blade attachment symmetrically in relation to the axis of rotation of the rotor, and inclosing the blades between clamps so that on heating locally by a uniform electric current, the blades and carrier rise to approximately the same temperature on welding the blades to the carrier so prepared, substantially as described.

3. Process for the attachment of turbine blades to their carriers consisting in partially isolating those portions of the carrier in the neighborhood of the points of attachment of the blades, to limit the cross-sectional area available for the conduction of heat therefrom; artifically increasing the volume of the blades by contacting them with metal masses of high heat conductive capacity and finally welding together the carriers and blades so prepared.

4. Process for the attachment of turbine blades to their carriers, consisting in forming circumferential grooves with intervening rings of metal around the carrier thereby limiting the cross sectional area available for the conduction of heat from the point of attachment so that on heating locally, said blade and said carrier rise to approximately the same temperature and welding each blade to a plurality of said rings, as set forth.

5. The method herein described of constructing a turbine wheel, ring or drum, the same consisting first in forming said wheel symmetrically in relation to its center of rotation with the parts next to the welding points reduced to properly conform to the volume of the blades and electrically welding said blades at the said points whereby the symmetry of the wheel is maintained.

In witness whereof I have hereunto set my hand in presence of two witnesses.

SEBASTIAN ZIANI DE FERRANTI.

Witnesses:
FRANCIS JAMES BIGNELL,
WALTER J. SKERTEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

13396

1904

CONTENTS:

Print (sheets 2 & 4) Dec 12/14

Application		paper.
1.	Rejection	June 22, 1904.
2.	Amd't A-	Sept 27, 1904.
3.	Rej	Jan 10, 1905.
4.	Argmt and Amdt. B	May 23, 1905
5.	Rejection.	Aug. 5- 1905
6.	Amendment C.	Oct. 10, 1905
7.	Rejection	Dec. 16, 1905.
8.	Amendment	April 9, 1906.
9.	Rejection.	May 1- 1906
10.	Argument and Amendment D	Oct. 18-1906
11.	Rejection	Dec. 10-1906
12.	Amendment E & Argument	Feb. 16 1907.
13.	Rejection	Mar. 11-1907
14.	Amendment F & Argument	Apr. 19,1907.
15.	Rejection	JUN 4 1907
16.	Amendment G	May 9-1908
17.	Rejection.	JUN 5 1908
18.	Amendment H	Apr. 30.1909
19.	Rejection	MAY 24 1909
20.	Amendment I and Sketch.	Dec. 8, 1909.
21.	Rejection.	JAN 14 1910
22.	Amendment J & Oath.	Mar. 14-1910
23.	Amendment K	Apr. 14-1910
24.	Rejection.	APR 26 1910
25.	Amendment L	June 25-1910
26.	Rejection.	JUL 23 1910
27.	Amendment M & Appearance	Dec. 8-1910

1307

28. Rejection.		JAN 6 1911
29. Amendment	M	Dec.18-1911
30. Letter.		Jan 20, 1912
31. Amendment	C-	Dec.30, 1912
32. Letter		Jan 18,1913
33. Amendment.	P-	Dec.29- 1913
34. Letter.		Jan 10, 1014
35. Letter.		Dec. 5, 1914
36. Letter		Dec 24, 1914
37. Letter.		Dec.29, 1914

U.S.PATENT OFFICE
JAN 9 1905
DIVISION No. 13

TITLE:

Impvovement in Process for Electrically Welding Turbine Blades

5 claims

(Cl 219 - 10.)

1398

(18)

Serial No. 208,034

3 Sheets-Sh 1

S. Z. DE FERRANTI.

PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221.

Patented July 27, 1915.

3 SHEETS-SHEET 1.



Fig. 2.

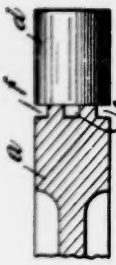


Fig. 3a.

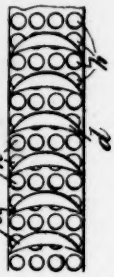


Fig. 6.

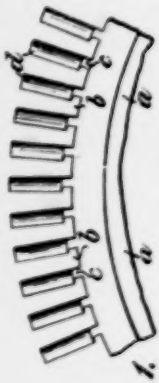


Fig. 1.



Fig. 1a.



Fig. 3.



Fig. 5.

ATTEST

Edward Sexton

INVENTOR

SEBASTIAN Z. DE FERRANTI.

By Dyer, Middleton, Donaldson & Dyer ATTYS

Examined Dec 29. 1914.

1309

No. 208,03

Sheets Sheet

S. Z. DE FERRANTI.

PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1904.

1,148,221.

Patented July 27, 1915.

3 SHEETS—SHEET 2.

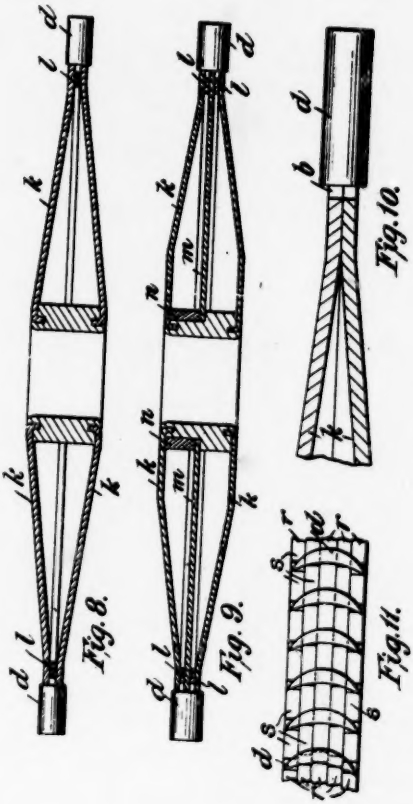


Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

WITNESSES:
Edward Sexton

INVENTOR
SEBASTIAN Z. DE FERRANTI
BY Spear, Middleton, Donaldson & Spear
ATTYS.

1310

Filed Mar 28 1911 — 208044 — B 4 — 4

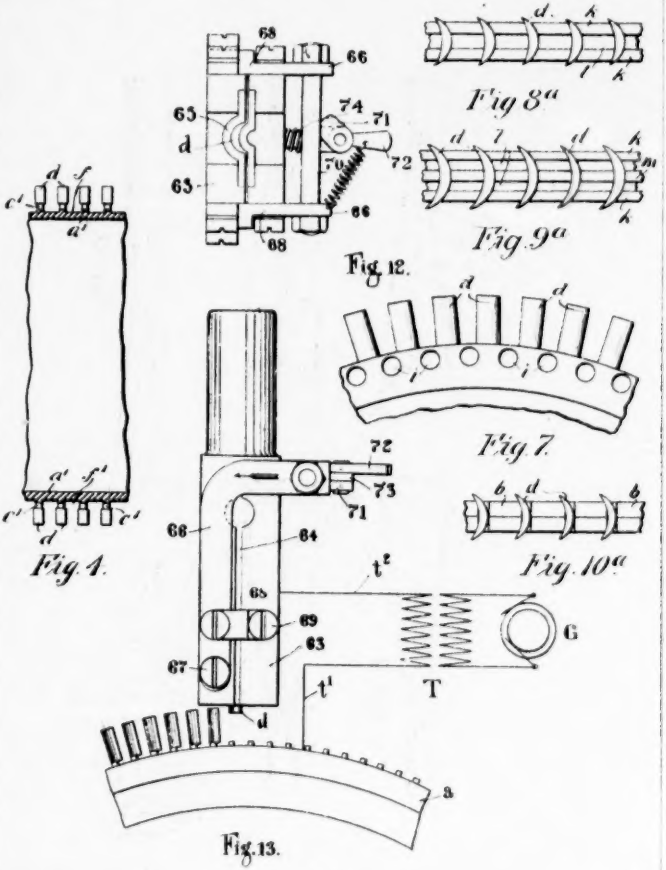
S. Z. DE FERRANTI.

PROCESS FOR ELECTRICALLY WELDING TURBINE BLADES.

APPLICATION FILED MAY 14, 1914.

1,148,221. **Patented July 27, 1915.**

3 SHEETS SHEET 3.



WITNESSES

H M Barrett

H. L. Alden

INVENTOR

Sebastian Z. de Ferranti

BY

Spear, Middleton, Donnelan & Spear

ATTORNEYS

Cancelled
Dec 27. 1914

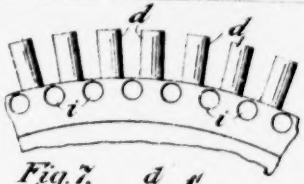


Fig. 7.



Fig. 7.



Fig. 8a



Fig. 9a



Fig. 10a

ATTEST:
Edward Sutton

INVENTION
SEBASTIAN Z. DE FERRANTI
By Speer Marshall Wilson & Speer
ATTYS

1312

12 Sheets 4

Canceled Sept 27, 1904

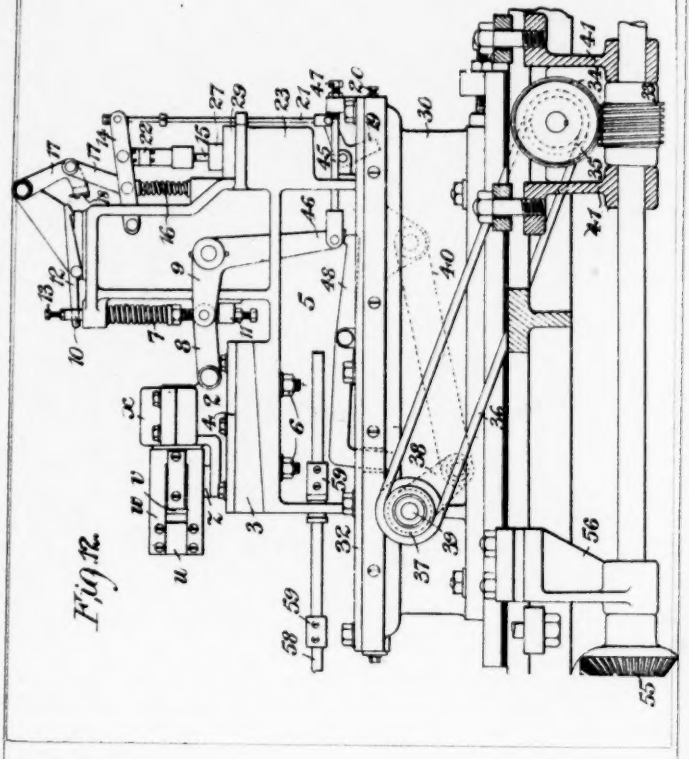


Fig 12.

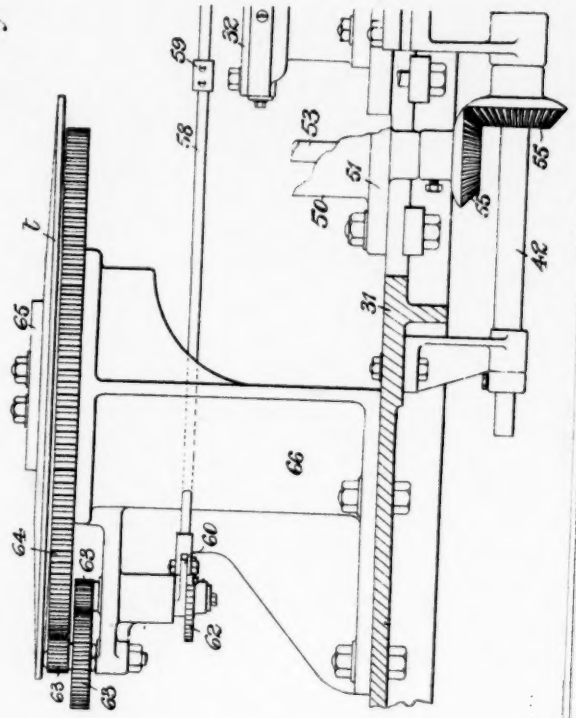
ATTEST
Edward Barton

INVENTOR
SEBASTIAN Z DE FERRANTI
By Spear Middleton Donaldson & Spear
ATTYS

208034
12 Sheets 5

Canceled Sept 27 - 1904

Fig. 12.



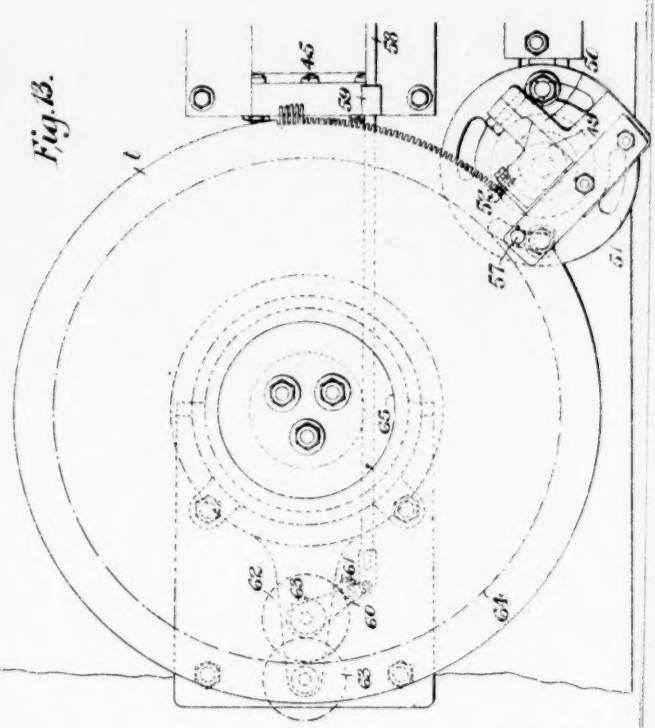
ATTEST:
Otto Wesselman
Edward Sexton

INVENTOR
SEBASTIAN Z. DE FERRANTI
By Geo. Middleton Bradbury & Spear
ATTYS

DIV 37.

Canceled Sept 27, 1904

Fig. 13.



INVENTOR
SEBASTIAN Z. DE FERRANTI

ATTEST
Edward Sexton

By Cleveland Mosselton Chamberlain & Spear
ATTYS

No 208,034.
12 Sheets-Sheet 7

Canceled Sept. 27-1904.

DIV. 37

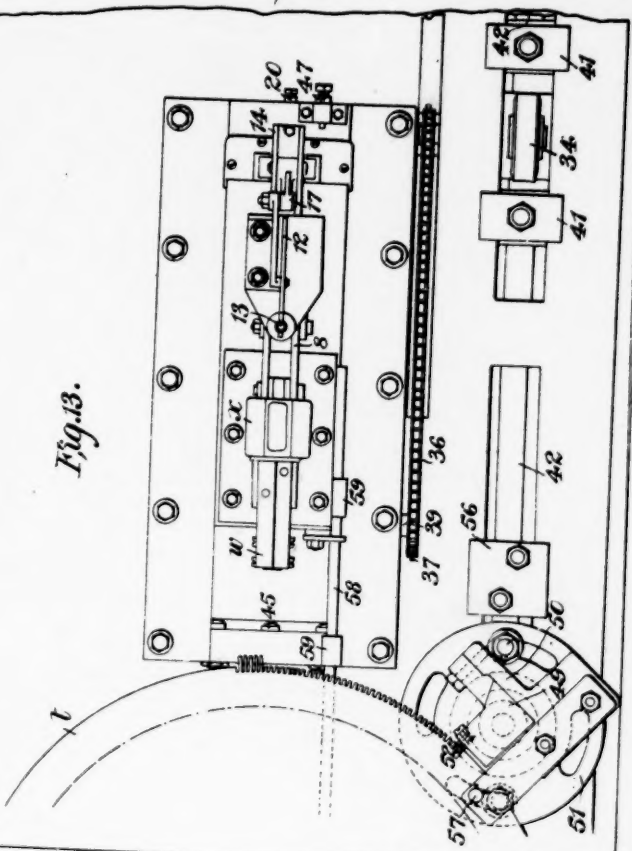


Fig. 13.

ATTEST.
Edward Sarton

INVENTOR
SEBASTIAN Z. DE FERRANTI
BY Dyer Brownlee Bowldon & Dyer
ATTYS

1316

208,034

12 Sheets Sheet 8

Cancelled Sept 27/76

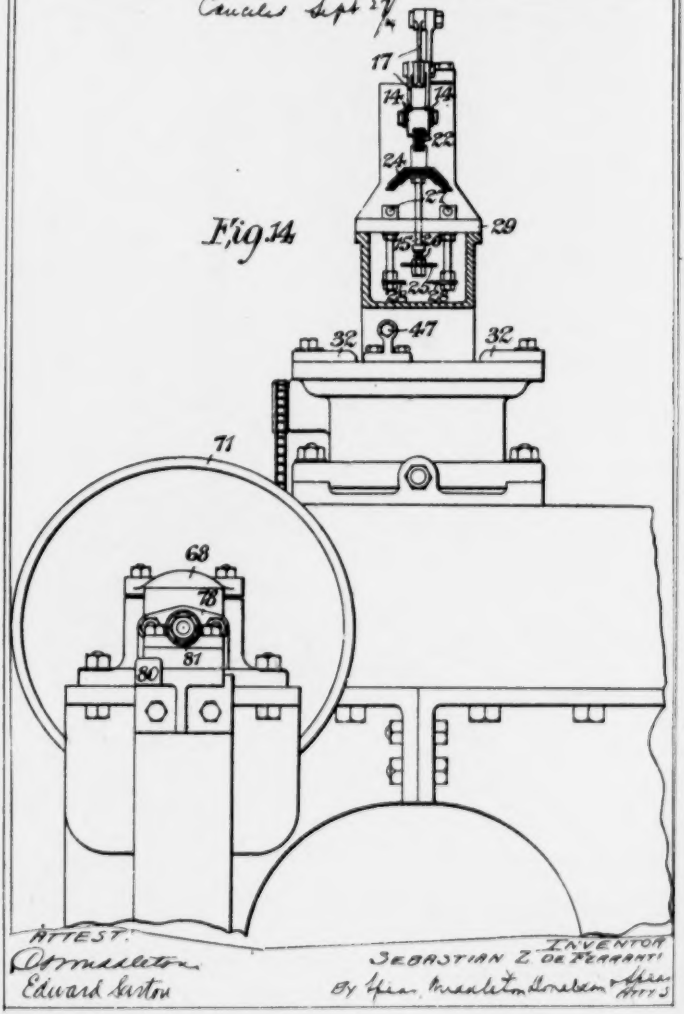


Fig. 14

ATTEST:

Edward Sexton

INVENTOR

SEBASTIAN Z. DE FERRANTI

By Munn & Co
Attys

Exh 37

Canceled Sept 27-1904.

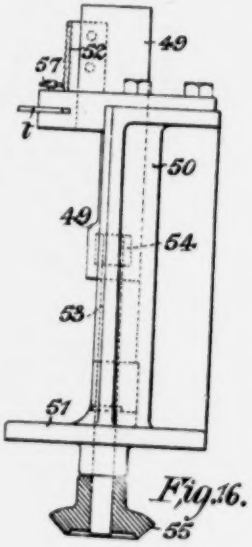


Fig. 16.

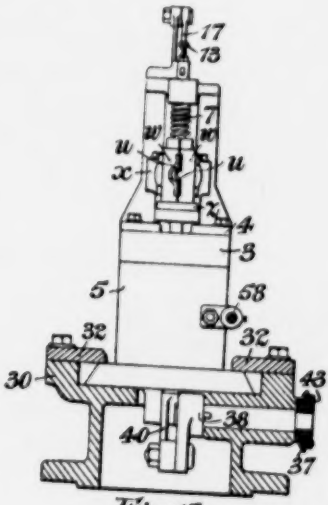


Fig. 15.

ATTEST:
Edward Sartor

INVENTOR
SEBASTIAN Z. DE FERRANTI
BY Speir, Middleton, Donaldson & Speir
ATTYS

1318

205,034

Sheet

Canceled Sept 27- 1904

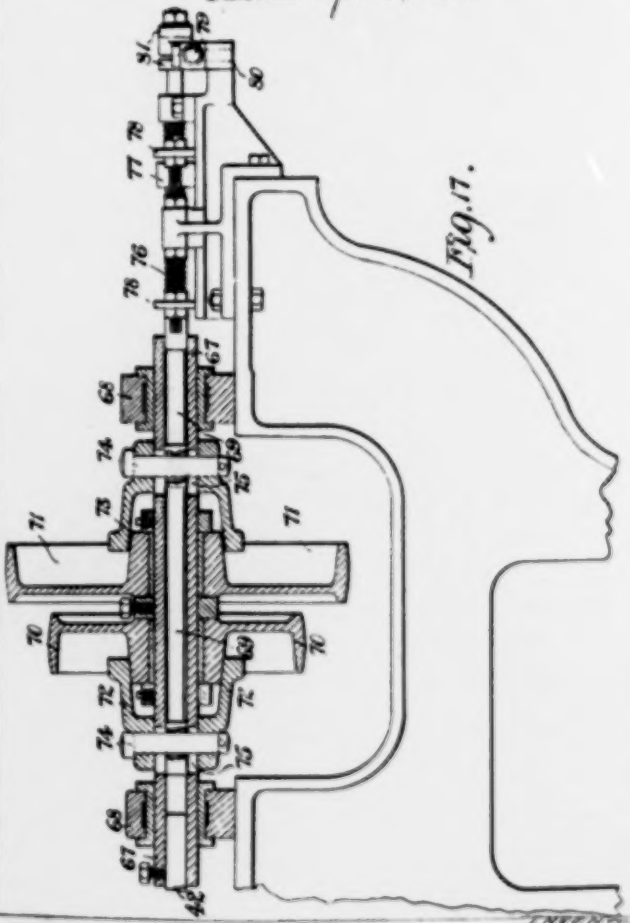


Fig. 17.

ATTEST
Edward Sutor

INVENTOR
SEBASTIAN Z. DE FERRANTI
BY Munn & Co
ATTYS.

3,048,034
Sheet

Canada Apl 27 1904

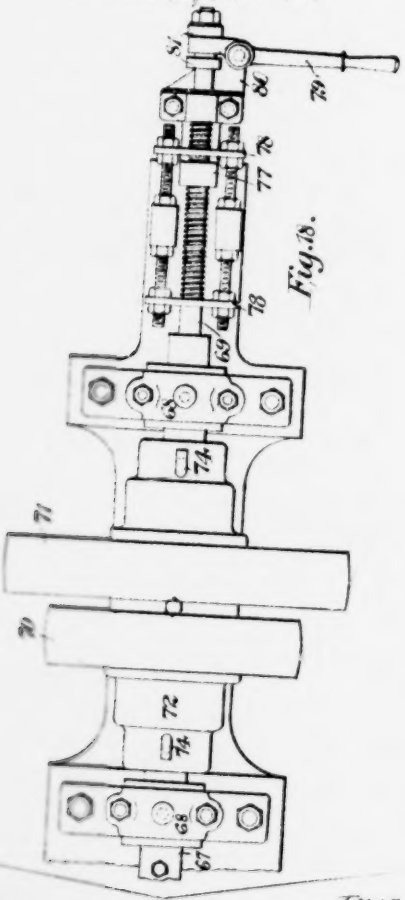


Fig. 3.

ATTEST:
Edward Sulte

INVENTOR
SEBASTIAN Z. DE FERRANTI
BY Cleveland Sweetser Dublin & Sweetser
ATTYS

1320

208,034

12 Sheets

Canceled Sept 27- 1904

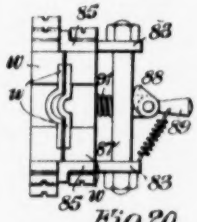


Fig.20.

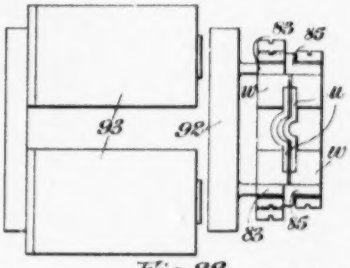


Fig.22.

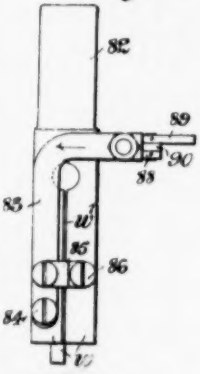


Fig.19.

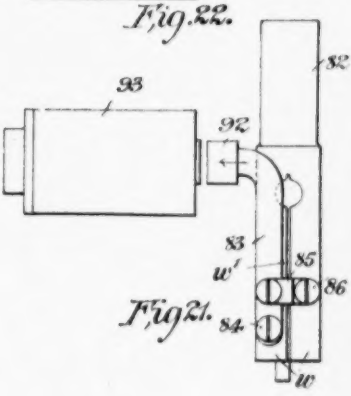


Fig.21.

ATTEST
Edward Sexton

INVENTOR
SEBASTIAN Z. DE FERRANTI.
By Munn & Co
ATTYS

CHART

TOO

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668464

APPLICATION FOR UNITED STATES PATENT

JAN 2 1912

Petition with Power of Attorney.

To the Commissioner of Patents:

Your petitioner SEBASTIAN ZIANI de FERRANTI,

subject of the King of Great Britain and Ireland, and resident of Grindleford Bridge, Sheffield, in the County of Derby, England,

whose Post-Office address is Grindleford Bridge, Sheffield, in the County of Derby, England,

prays that Letters Patent may be granted to him for improvements in and relating to electric welding, (which he has divided out from his main application Serial No. 208034 filed 14th May 1904)

as set forth in the annexed specification.

And he hereby appoint s SPEAR MIDDLETON DONALDSON & SPEAR, (Ellis Spear, Frank L. Middleton, Walter Donaldson & James M. Spear,) of Washington D.C., Registration Number 6323, his Attorneys with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign the drawings, to receive the Patent, and to transact all business in the Patent Office connected therewith.

Signed at Sheffield England

this 16th day of December 1911

Sebastian Ziani de Ferranti

1324

TO ALL WHOM IT MAY CONCERN :

BE IT KNOWN THAT I, Sebastian Ziani de Ferranti, a subject of the King of Great Britain and Ireland, and residing at Grindleford Bridge, Sheffield, in the County of Derby, England, have invented certain new and useful "Improvements in and relating to electric welding" of which the following is a specification:-

668464
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This invention relates to electric welding and is a divisional application from my patent application Serial No. 208034.

In electric welding as at present practised, it is customary to arrange that the weld is formed over the whole of the juxtaposed surfaces of the parts being welded. The amount of current required varies of course with the extent of the contacting surfaces, and when these are large the difficulty in forming the weld and the cost thereof increases.

In many cases ~~for example, in sheet metal work~~ to form the weld over the whole of the opposing surface would be quite unnecessary and out of proportion to the strength required, and I have devised a method by the employment of which welds of the desired strength can be obtained ~~in the above and other manufactures~~ in an exceedingly economical manner.

My invention consists in the improved processes and articles to be hereinafter described.

Referring now to the accompanying drawings,

Figure 1 shows an edge view of a turbine bladed element, the blades of which are welded in accordance with my invention.

Figure 2 is a part side elevation of the bladed element shown in Figure 1.

In carrying my invention into effect according to the form shown in the accompanying drawing, the turbine wheel or disc, a, has two intersecting sets of grooves, g, cut in the periphery thereof, so as to leave a series of projections, f, in the surface of the turbine wheel. The blade, d, is welded to certain of the projections, f, by passing across the points of contact

of the opposing surfaces, an electric current in a known manner.

It will thus be seen that on the completion of the welding operation the blades will be attached to the wheel or disc by a plurality of welds isolated from one another.

By my improved process it will be evident that considerable economy is effected in the cost of electrically welding the blade to the wheel or disc in comparison with methods at present in use.

I wish it to be understood that although I have described my invention as applied to the construction of a turbine wheel or disc, it is not limited to such, as it is of general application and may be applied in other circumstances where it is unnecessary or undesirable to form the weld over the whole of the contacting surfaces of the parts to be welded.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:-

1. A process for uniting two parts together consisting in utilising portions only of the individual juxtaposed surfaces for the transference of electric heating current so as to limit the heating effect of said current substantially to said portions and applying pressure so as to unite the parts by a weld of less area than that of the juxtaposed surfaces.

2. A process for uniting two parts together consisting in utilising portions only of the individual juxtaposed surfaces for the transference of an electric current the utilised portions being prepared so as to localise the heating effect of said current and applying pressure to unite the parts by a plurality of isolated electric welds.

3. A process for uniting two parts together consisting in leading an electric current across portions only of the individual juxtaposed surfaces of the parts and applying pressure to said parts so as to integrally unite the individual juxtaposed surfaces together by a plurality of isolated electric welds.

4. A process for uniting two parts together consisting in forming projections on one of the individual juxtaposed surfaces of said parts leading an electric current across the parts by way of said projections and applying pressure to unite the individual juxtaposed surfaces by a plurality of isolated electric welds.

5. A metal article having component parts thereof united by a weld of less area than that of the juxtaposed surfaces.

6. Composite metal articles having individual abutting portions united together by a plurality of isolated welds.

7. A metal article having a plurality of current localising portions formed on one of its surfaces.

WP/LW.

1028

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

Sebastian Ziani de Ferranti

Witnesses:
(1) Edward Knight Gratwick.
(2) William Duncan Davidson

OATH.

AMERICAN CONSULATE
SHEFFIELD } ss.

SEBASTIAN ZIANI DE FERRANTI,

the above named petitioner being duly sworn deposes and says that he is a subject of the King of Great Britain and Ireland, and resident of Grindleford Bridge, Sheffield, in the County of Derby, England, that he verily believes himself to be the original, first, and sole inventor of the improvements in and relating to electric welding, (which he has divided out from his main application Serial No. 208034 filed 14th May 1904)

described and claimed in the annexed specification; that he do not know and do not believe the same was ever known or used before his invention or discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application, or patented in any country foreign to the United States on an application filed more than twelve months before this application; or in public use or on sale in the United States for more than two years prior to this application; and that no application for patent on said improvements has been filed by him or his representatives or assigns in any country foreign to the United States, except as follows: Great Britain No. 11921 filed 20-5-04, Switzerland filed 20-5-04, Austria filed 20-5-04, Germany filed 21-5-04, Belgium filed 26-5-04, Hungary filed 28-5-04, France filed 31-5-04, Russia filed 27/4/10/5/05, Canada filed 23-5-05, Japan filed 9-6-05 and Italy filed 27-7-05.

Sebastian Ziani de Ferranti

Sworn to and subscribed before me, this 16th day of December, 1911

Rice K Evans
(Signature of officer administering oath)

VICE OC ~~United States of America~~.
Sheffield, England.

664464

1329

Div. 3 Class 175 Sub.

Paper No. 2.

WLR/KAJ

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE
WASHINGTON Jan. 29, 1912.

S. Z. deFerranti,

Care Spear, Middleton, Donaldson and Spear,

City.

Please find below a communication from the EXAMINER in charge of your application.

668,464, filed Dec. 29, 1911----

Electric Welding.

E. B. Allen.
Commissioner of Patents.

Applicant calls this case a division of his application NO. 208,034, but it is found that this application page 2, lines 12 to 15, refers to welding sheets of metal together, face to face. There is no reference in the prior application to welding sheets, it being entirely limited to welding the ends of turbine blades to their carrier. For this reason this case is not a division of the prior case and is not entitled to the date thereof for the purpose of avoiding references.

Page 2, line 31, reference letter "f" is used but it is not found on the drawing.

Claims 5, 6 and 7 are for an article which is considered independent of an electric welding process such as set forth in claims 1 to 4 and they relate to a subject of invention which is separately classified from welding processes. Division is therefore required between claims 5, 6 and 7 and the remaining claims. It is not clear but that these claims are also barred in this application on account of applicant's patent 874,398. Dec. 24, 1907, Steam Eng. Rotary. There appears to be no line of division between these claims and claims in the patent.

668464

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Claims 1 to 4 are rejected upon each of the following patents-----

Wexham, 496,690, May 9, 1893, 219 - 10,
Kleinschmidt, 616,436, Dec. 20,1898, 219 - 10,
Hunter, 690,958, Jan. 14,1902, 219 - 10,

Fr. patent to Egel, 335,889, published Feb. 18, 1904, 219 -10

Fr. patent to Egel, 336,187, published Mar. 1, 1904, 219 - 10.

Since as stated above applicant is not entitled to the date of the prior application referred to these claims are also rejected upon Br. patent Harmatta, 22,981, of 1903, 219 - 10, or Rietzel, 928,701, Jul. 20, 1909, 219 - 10.

Wm. J. Rich
Examiner, Div. 3.

W

168704

Room 175.
S.Z.de Ferranti.
Serial No. 668464.
Filed December 29th,1911.
"ELECTRIC WELDING".

To the Commissioner of Patents.

Sir

This amendment is in reply to the Official letter of January 24th, 1913.

Page 2, line 11, erase "for example in sheet metal work"

lines 16 and 17, cancel "in the above and other manufactures"

As applicant has now erased the matter objected to by the Examiner as being not present in the parent application No. [illegible]4, it is respectfully submitted that the application as now amended is entitled to the date of the parent application.

Cancel claims 5, 6 and 7 at present on file.

With regard to claims 1 to 4 which the Examiner has rejected upon Meehan, Fleischmidt and Hunter, the applicant would respectfully point out that none of these citations appear to him to disclose a process of welding in which two parts are united together by a weld of less area than the juxtaposed surfaces.

With regard to Meehan's specification No.4[illegible]2, the applicant would respectfully point out that when the weld is finished according to the process in this specification, it extends over the whole surface of the juxtaposed surfaces. In evidence of this, attention is called to Page 1, line 31, where it is stated: "Figure 3 is a side view of a portion of a rail formed from the two abutting ends of rails shown in

Figure 2 after welding." In the applicant's article when finished, however, the juxtaposed surfaces are not united over their whole area by the resulting weld, but are united by a weld of less area than the juxtaposed surfaces.

In view of this important difference between Moxham's process and the applicant's, the applicant respectfully submits that the claims as at present on file are clear of this reference.

With regard to Kleinschmidt's specification No. 616436, the applicant would respectfully point out that in this case also the weld is formed over the whole of the juxtaposed surfaces, and on Page 1, a confirmation of this statement will be found at line 53, where it is stated that: "Figure 3 shows a cross-section of a completed weld between two spliced bars and the rail taken on a line which would pass through one of the bosses b." From the figure it will be evident that the weld extends over the whole of the juxtaposed surfaces, and accordingly the applicant submits that the claims as at present on file are clear of this reference also.

With regard to Hunter's specification No.690958, the applicant would point out that in this case the projections which are formed before welding, are melted off so that the molten metal spreads over the whole surfaces of the overlapping portions, and forms a complete weld, and Page 1, line 56, is cited as showing that a whole weld is formed between the overlapping surfaces, which states: "and as the metal in the immediate vicinity of the projections on the two plates melts, small lakes of molten metal are formed which quickly spread and unite, making a full transverse weld."

It is evident from the processes disclosed in these three specifications, that in none of them is there any disclosure of the applicant's invention, as in each case it would appear that the whole of the juxtaposed surfaces are welded together. The applicant, however, unites the two parts together, not over the whole of the juxtaposed surfaces, but by a weld having an area of less extent than that of said surfaces. By this method he is enabled to weld two parts together by a series of welds which economize the amount of electric current used, and can be so arranged as to give the desired strength of weld.

In view of the great importance of this form of welding and the economy which it effects in the current, it will be evident that the applicant has effected a material advance upon the state of the art cited by the Examiner, and for this reason respectfully requests a reconsideration of the case.

Would the Examiner be good enough to insert the reference letter "f" in the drawing to designate the projections to which the blades, d, are welded.

With regard to the French patents to Egel, and the British patents to Haramatta, and Rietzel, the applicant would respectfully point out that as he has now eliminated from his specification the matter objected to by the Examiner as not contained in the parent application, he respectfully requests that these reference be discarded, as he claims the date of his British Patent Application, viz., May 25th, 1903, which is prior to the dates of these references.

Early allowance of the case is respectfully requested.

-o-

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Respectfully,

S.Z.de Ferranti,

By

Speer Middleton Amsden & Speer

ATTORNEYS.

Ly 3012

WB/LW.

469464
/2

1335

175

Paper No. 4

All communications regarding this application should give the serial number, date of filing, and title of invention.

S. Z. de Ferranti, DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON Jan. 18, 1913.

S. Z. de Ferranti,

c/o Spear, Middleton, Donaldson and Spear,

City.

FILED

[illegible] from the EXAMINER in charge of your application.

648,464 , filed Dec. 29, 1911---

Electric Welding.

E. B. Moore

Commissioner of Patents.

Replying to amendment filed Dec. 31, 1912.

Applicant has canceled the reference to the welding of sheet metal. This, in connection with the fact that the original case serial number 208,034, was limited exclusively to the welding of turbine blades, may be taken to warrant the position that the present claims in this case are either not warranted or must be construed to be for a different principle and process from that involved in the Rietzel and Marmetta case. The claims, therefore, while taken in the terms expressed, as broad enough to include these processes, are actually not considered to relate to the same type of process. They should be revised in this repsect so as to bring out more clearly the idea involved in applicant's original disclosure, that is of the welding of two massive pieces of metal together but with surface contact less than the cross section of the pieces. Taken in this light the claims appear to be fully met by----Moxham, Kleinschmidt and Hunter of record. The patent to Perry, 576,039, Jan. 26, 1897, 39, Fences. Sub. 72, also meets the terms of these claims. The statement in applicant's remarks that the metal spreads over the whole surface

by

in Hunter's process
of the overlapped portions/is not considered accurate. It is thought that the welding portion would form a line or strip of less extent than the whole area of the overlapped portion.

Applicant's attention is called to the fact that if he wishes to rely upon the date of a foreign application that such application must be proven by filing a certified copy of the application as filed, ex parte Pauling, 1905, C.D., 131.

Wm. F. Rich
Examiner Div. 3.

668,464
14

175

62

WLR/RAJ

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

Mar. 7, 1913.

Spear, Middleton, Donaldson & Spear,

Washington,

D.C.

Please find below a communication from the Examiner in charge of your application.

S. Z. deFerranti, Electric Welding,

668,464. filed Dec. 29, 1911.

Supplemental to Office letter of Jan. 18, 1913, applicant's attention is called to---

Harmatta, 1,046,066, Dec. 3, 1912, 219 - 10,

In accordance with the the principle set forth in ex parte Card and Card, 1904 C.D., 383, it is thought that if applicant is found entitled to claims along the line of those in this patent that an interference would be necessary between applicant and Harmatta.

M.

Examiner, Division 3.

668,464
18

1338

Serial No. 668464
Paper No 6 Amendment B

Room 175.
S. Z. de Ferranti.
"ELECTRIC WELDING".
Serial No.668464.
Filed December 29th, 1911.

To the Commissioner of Patents.

Sir,

This amendment is in reply to the Official letters of January 18th,1913, and March 7th, 1913.

Applicant files herewith a certified copy of the British specification No.11921 of 1903, showing the Provisional Specification as filed on the 25th of May 1903, the date which the applicant claims under the International Convention.

Claim 4, line 2, after "on" insert "one of"

Insert the following claims:-

B'

5. A process of uniting two parts togethe consisting in forming one of the juxtaposed surfaces of said parts with relatively raised and depressed portions and leading an electric current across the parts by way of said raised portions and applying pressure to unite the juxtaposed surfaces by a plurality of isolated electric welds.

6. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localised in such spots.

7. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-

668464

-1-

defined areas of no union, consisting in applying pressure localised at the spots of desired union and passing electric current through the pieces from one to the other, while confining the flow of current to said spots until the union is effected.

8. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localising the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

9. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together and passing a welding electric current from one to the other while localising the pressure in and confining the flow of current to the spot or spots of desired union, so as to produce an isolated spot or spots of union leaving distinct or well-defined areas in which the pieces are not welded together.

Claims 6 to 9 are claims 1 to 4 from Patent Specification No.1,046,066 to Harmatta, and the applicant respectfully requests that an Interference be declared with Harmatta, in order to decide the priority of the invention as stated in the above claims.

Respectfully,

S.Z.DE FERRANTI,

By [signature]

ATTORNEYS.

E/IE

Consulate-General of the United States of America,
for Great Britain and Ireland, at London.

I, [illegible] Consul-General of the United States of America for Great Britain and Ireland at London, do hereby make known and certify to all whom it may concern, that the signature [illegible] subscribed to the annexed Certificate is of the true and proper handwriting of Walter L. Fleming, Comptroller General of [illegible], Georgia, U.S.A.

that the seal affixed to the said Certificate is the seal of the [illegible]

and that to all acts signed as the annexed full faith and credit are and ought to be given in Judicature and thereout.

In testimony whereof I have hereunto set my hand and affixed the Seal of the Consulate-General of the United States at London, aforesaid, this [illegible] day of [illegible] 191[illegible]

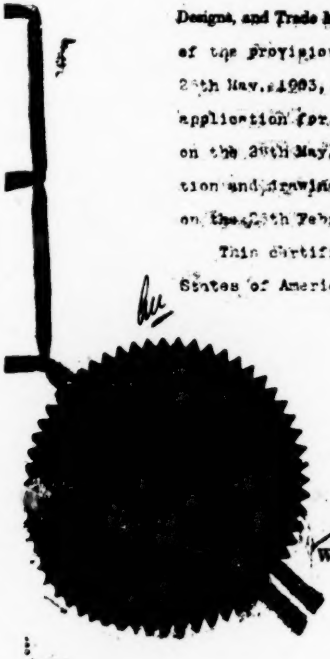
[illegible]
Consul-General.

Form P. Cert. 1.

PATENTS AND DESIGNS ACT, 1907.

IT IS HEREBY CERTIFIED by the Comptroller-General of Patents, Designs, and Trade Marks that the annexed are true copies of the provisional specification as lodged on the 25th May, 1903, in connection with de Ferranti's application for Patent No. 11,521 of 1903, filed on the 25th May, 1903, and of the complete specification and drawings as left in connection therewith on the 25th February, 1904.

This certificate is issued for use in the United States of America.



Witness my hand this 3rd day of April, 1912.

W. Temple Franks

Comptroller-General of Patents, Designs, and Trade Marks.

...ton Buildings,
...don, W.C.

...1000 10/12. A.&E.W.

1312

N° 11,921 A.D. 190

Date of Application, 25th May, 1903
Complete Specification Left, 25th Feb., 1904—Accepted, 25th Aug., 1904

PROVISIONAL SPECIFICATION.

"Improvements in and relating to the Electric Welding of Turbine Blades."

I, SEBASTIAN ZIANI DE FERRANTI, Engineer, of 41, Lyndhurst Road, Hampstead, London, N.W., do hereby declare the nature of this invention to be as follows:—

The invention relates to improvements in methods of electrically welding of turbine blades to the discs or drums carrying them, and has for its object to overcome the difficulties which have been experienced in electrically welding together the two parts which differ considerably as regards their power of rising to the required welding temperature when heated at the point of junction.

The main difficulty arises through the blades and their carrying discs differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the disc, ring or the like to which it is to be secured it is found that the comparatively large volume of metal forming the disc rapidly conducts heat away from the welding point, thus preventing the temperature of the disc part rising to the required extent and causing an unsatisfactory weld.

The invention therefore consists broadly in adjusting the volume of metal of the disc in the neighbourhood of the welding point so that approximately equal heating occurs in both faces to be welded, whereby turbine wheels with welded blades may be reliably produced in an inexpensive way.

In carrying out my invention according to one modification grooves may be cut across the edge of the ring or several grooves may run circumferentially completely round the edge, or again intersecting sets of grooves inclined to one another may be cut on the edge of the ring.

According to another modification, radial holes may be bored a short distance into the edge, either arranged in patterns so as to leave intervening projections or untouched metal to which the blades may be welded or arranged with no particular reference to the position of the blades.

The object to be kept in mind in this as in other modifications is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint.

Again, the result aimed at may be secured by boring holes through from face to face of the ring at a radius slightly less than that of its outside edge.

According to another modification of the invention, the ring may be built up of two or more thinner rings held in their relative positions by distance pieces or in any other convenient manner, the blades being then welded in position on their outside edges.

Again, the ring may be built up of a set of thin laminæ, the edges of which are notched, the laminæ being assembled in such a way that the notches

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POOR CO

Improvements in and relating to the Electric Welding of Turbine Blades.

...ripped" with regard to each other, the intervening projections of metal ...e following the shape of the turbine blades to be welded to them.

Dated this 20th day of May 1903.

MARKS & CLERK.
58, Southampton Buildings, London, W.C.
13, Temple Street, Birmingham, and
30, Cross Street Manchester,
Agents.

COMPLETE SPECIFICATION.

"Improvements in and relating to the Electric Welding of Turbine Blades."

I, SEBASTIAN ZIANI DE FERRANTI, Engineer, of 31, Lyndhurst Road, Hampstead, London, N.W., do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The invention relates to improvements in and relating to methods of electrically welding turbine blades to the discs, drums or the like carrying them and has for its object to overcome the difficulties which have been experienced in electrically welding together two such parts differing considerably as regards their power of rising to the required welding temperature when heated at the point of junction, so that blade carrying elements with welded blades may be reliably produced in an inexpensive manner.

The main difficulty arises through the blades and their carriers differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the carrier to which it is to be secured, it is found that the comparatively large volume of metal forming the carrier rapidly conducts heat away from the welding point, thus preventing the temperature of the carrier rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of the blade carrying element in the neighbourhood of the welding point, so that approximately equal heating occurs in both faces to be welded.

Referring to the accompanying drawings which, with the exception of Figure 4, show the invention applied, by way of example, to a type of parallel flow turbine in which the blades are mounted on the edge of a wheel-like body,

Figure 1 is a part side elevation of such a wheel having cross grooves,

Figure 1ª being an edge view;

Figure 2 shows a similar edge view of a modification in which sets of inter...ecting grooves are adopted;

Figure 3 shows an edge view of a form having circumferential grooves,

Figure 3ª being a section on the line A B of Figure 3;

Figure 4 shows, in longitudinal sectional elevation, part of a drum carrier to which the blades are welded in accordance with one form of the invention;

Figures 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disc, while

Figure 7 is a part side elevation in which holes are bored through from face to face of the disc;

Figure 8 shows a sectional plan of a form of wheel built up of two dished discs, held apart at their circumferential portions by distance pieces,

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OPY

Figure 8ª being a scrap edge view to a larger scale;

Figure 9 is a similar sectional plan of a modified form of wheel built up of three discs, while

Figure 9ª is a corresponding scrap edge view also to a larger scale:

Figure 10 shows a part sectional elevation of a wheel built up of two comparatively thick discs having notched edges.

Figure 10ª being a scrap edge view, while finally

Figure 11 shows an edge view of a form of wheel built up of a series of "stepped" laminæ.

It will be seen that all the edge views are shown as developments for clearness of drawing and not as true projections.

The same reference symbols are, when possible, used in the accompanying drawings to denote similar parts.

In carrying out the invention according to the form shown in Figures 1 and 1ª, the turbine wheel or disc is shown at *a*, cross grooves, *c*, being cut in its circumferential edge so as to leave projecting portions of metal, *c*, to which the turbine blades, *d*, are welded.

The same object is attained by cutting two intersecting sets of grooves, *e*, in the edge of the disc, as is shown in Figure 2, or by cutting circumferential grooves, such as *f*, completely round the edge (see Figures 3 and 3ª.)

Figure 4 shows the invention, according to one form, applied to the case of a drum blade carrier, *a*¹; the drum is grooved circumferentially with grooves, *f*¹, the intervening collars of metal being then cross-cut to form projecting teeth, *c*¹, on which the blades are welded.

According to a modified form, radial holes, *h*, may be bored a short distance into the edge of the disc, these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in Figure 5, or arranged without particular reference to the position of the blades, (see Figure 6).

In Figure 7, a method is shown of removing metal in the neighbourhood of the welding point by boring holes, *i*, through (or partly through) from face to face of the disc at a radius slightly less than that of its outside edge.

The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, whilst at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint.

Referring now to Figures 8 and 8ª, a form of wheel is shown somewhat diagrammatically which is built up of two dished discs, *k*, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces such as *l*, disposed at a radius somewhat less than the maximum radius of the discs, the blades, *d*, being welded in position on their outside edges.

Figures 9 and 9ª show a type of wheel generally similar to that last described but having an intermediate plate disc *m*, in addition to the two dished discs, *k*: a portion, *n*, of the hub, *o*, in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, *l*, are indicated as before but any other convenient method of holding the discs in their correct relative position may be adopted.

In Figures 8 and 9, the dished discs, *k*, are indicated as secured to the hubs, *o*, by pressing the inner edges of these discs into grooves and subsequently [illegible] over the hubs to hold the discs in place.

In the modification shown in Figure 10 and 10ª two dished discs, *k*, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, *b*, being cut in their edges in accordance with the method described above with reference to Figures 1 and 1ª.

Again, that portion of the disc carrying the blades, may be built up of a set of discs, similar to, say Figure 11, the edges of which are notched as at *s*, the pieces being assembled in such a way that the notches, *s*, are "stepped"

with regard to each other, and that the intervening projections of metal may follow the shape of the turbine blades to be united to them.

Instead of welding the laminæ, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

In an invention such as the present, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the same is sufficiently indicated by the many examples given above, and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described above by way of example.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In turbines, the method of welding the turbine blades to the elements carrying them, consisting in so adjusting the volume of metal in the blade carrier in the neighbourhood of the welding point, that approximately equal heating occurs in the two parts, substantially as described.

2. In turbines, blade carrying elements having blades welded thereupon in accordance with the method claimed in Claim 1.

3. In turbines, grooving the blade carrier in the neighbourhood of the welding point, substantially as and for the purpose described.

4. The bladed turbine element, hereinbefore described with reference to Figures 1 and 1ª of the accompanying drawings.

5. The bladed turbine element, hereinbefore described with reference to Figure 2 of the accompanying drawings.

6. The bladed turbine element, hereinbefore described with reference to Figures 3 and 3ª of the accompanying drawings.

7. The bladed turbine element, hereinbefore described with reference to Figure 4 of the accompanying drawings.

8. In turbines, forming holes in the blade carrier in the neighbourhood of the welding point, substantially as and for the purpose described.

9. The bladed turbine elements hereinbefore described with reference to Figures 5 and 6 of the accompanying drawings.

10. The bladed turbine element, hereinbefore described with reference to Figure 7 of the accompanying drawings.

11. In turbines, welding the blade carriers of comparatively thin parts across the non-touching edges of which the blades are welded, substantially as described.

12. The bladed turbine element, hereinbefore described with reference to Figures 8 and 8ª of the accompanying drawings.

13. The bladed turbine element, hereinbefore described with reference to Figures 9 and 9ª of the accompanying drawings.

14. The bladed turbine element, hereinbefore described with reference to Figures 10 and 10ª of the accompanying drawings.

15. In turbines, building the blade carriers of prepared laminæ assembled in a "stepped" manner, substantially as and for the purpose hereinbefore described.

16. The bladed turbine element, hereinbefore described with reference to Figure 11 of the accompanying drawings.

Dated this 27th day of February, 1904.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.
14, Temple Street, Birmingham, and
30, Cross Street, Manchester,
Agents.

Printed by H.M. Stationery Office, by Love & Malcomson, Ltd.
(C. 8710—50—7/1905.)

DE FERRANTI Overhead Conductor

2nd Edition

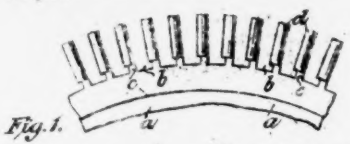


Fig. 1.



Fig. 2.

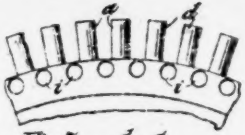


Fig. 7.

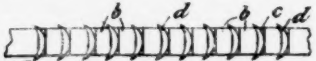


Fig. 1a.



Fig. 3.

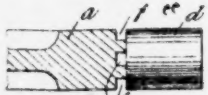


Fig. 3a



Fig. 4.



Fig. 5.



Fig. 6.

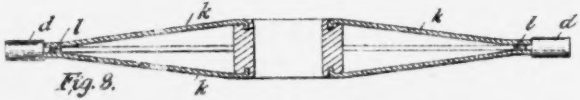


Fig. 8.



Fig. 8a

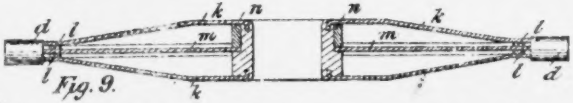


Fig. 9.

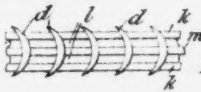


Fig. 9a



Fig. 11.



Fig. 10.

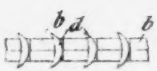


Fig. 10a

[This Drawing is a reproduction of the Original on a reduced scale]

INTERFERENCE.

Interference No. 35709 Paper No. 7

Name, Sebastian Z. de Ferranti

Serial No. 668464

Title, Electric Welding

Filed, Dec. 29, 1911

Interference with Johann Hausmann

DECISIONS OF

Primary Examiner, ... Dated, ...

Ex'r of Interferences, Adcock Dated, March 18/18.

Board, ... Dated, ...

Commissioner ..... Dated, ...

REMARKS:

668464
23

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

6—1916

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Paper No. 3
[INTERFERENCE] 2E 3

Oct. 2, 1913
WLR/RAC

DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.

U.S. PATENT OFFICE
INTERFERENCE DIVISION
OCT 7 1913
MAILED.

Spear, Middleton, Donaldson and Spear,
Washington, D.C.

Herein find letter [illegible] of a communication from the Examiner concerning the application of Sebastian Ziani de Ferranti, for Electric Welding, filed Dec. 29, 1911, Ser. No. 668,464.

Very respectfully.

Form No. 175

E. B. Moore
Commissioner of Patents.

67709

The case, above referred to, is adjudged to interfere with others, hereafter specified, and the question of priority will be determined in conformity with the Rules.

The statement demanded by Rule 110 must be sealed up and filed on or before DEC 1 1913, with the subject of the interference, and marked with the number of the interference, indorsed on the envelope. The subject-matter involved in the interference is

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

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4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

The interference involves your application for Electric Welding, application above identified and a patent/granted to Johann Harmatta whose post office address is Szepesvaralja, Austria-Hungary, whose assignee is the Thomson Electric Welding Co., Lynn, Massachusetts and whose attorney is O. F. Duffy abd Son, 612 F. St., N.W., Washington, D.C.

The relation of the counts of the interference to the claims of the respective parties is as follows:---

Counts	De Ferranti	Harmatta,
1	6	1
2	7	2
3	8	3
	9	4

Wm. J. Rich
Examiner, Division 3.

68464
27

668,464 — 9.

ear, Middleton, Donaldson & Spear
ATTORNEYS IN PATENT CASES
AMERICAN AND FOREIGN
VICTOR BUILDING

ELLIS SPEAR (1874-1917)
FORMERLY SOLICITOR OF PATENTS
P. L. MIDDLETON
WALTER DONALDSON
JAMES M. SPEAR
WILLIAM F. HALL
OF COUNSEL: ROBERT SPEAR, WASHINGTON

RECEIVED
JUL 14 1917
U. S. PATENT OFFICE

WASHINGTON, D. C. July 14, 1917.

CHURCH & CHURCH
JUL 14 1917
WASHINGTON, D.C.

Hon Commissioner of Patents,

Washington, D. C.

S I R :-

We request that you recognize Mr. Melville Church as our associate in the matter of the application of Sebastian Z. de Ferranti, serial number 668464, filed December 29, 1911, and in the Interference No. 76709 in which said application is involved.

Very respectfully,

Spear Middleton Donaldson & Spear

RBO

1912

CONTENTS:

Print

1. Application papers.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
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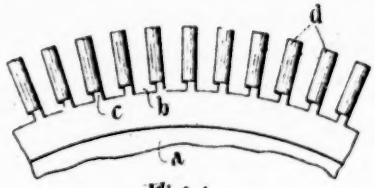


Fig. 1.

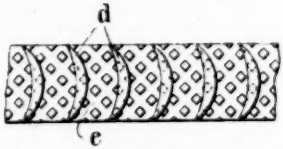


Fig. 2.

Witnesses.
C. Parsons
F. P. Dewey

Inventor.
[illegible]
Attorney.

No 32

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the File Wrapper, Contents and Canceled Drawings in the matter of the

Letters Patent of

Johann Harmatta, Assignor to

Thomson Electric Welding Company,

Number 1,046,066, Granted December 3, 1912,

for

Improvement in Electric Welding.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 11th day of August, in the year of our Lord one thousand nine hundred and seventeen and of the Independence of the United States of America the one hundred and forty-second.

Acting Commissioner of Patents.

Case 1

2-437

NUMBER (SERIES OF 1900).

183,677 1903

47

DIV. ~~X~~ 13 37 26 3

(EX'R'S BOOK) 15 235/9

2- 3.

PATENT No. 1046066

Name Johann Harmatta
Assor to Thomson Electric Welding Company, of Lynn, Mass. a corp. of Mass

, 190

of Szepesvaralja

County of

State of Austria-Hungary

Invention Electric Welding

, filed

Division of App., No.

PARTS OF APPLICATION FILED.

	ORIGINAL.		RENEWED.	
Petition	Dec 3	, 1903		, 19
Affidavit	" "	, 1903		, 19
Specification	" "	, 1903		, 19
Drawing	" "	, 1903		, 19
Sub. Dwg.	May 14, 1904.			
Model or Specimen	Jan 27, 1910	, 190		, 19
First Fee Cash $15.	Dec 2	, 1903		, 19
" ✓ Cert.		, 190		, 19
Appl. filed complete	Dec 3	, 1903		, 19
Examined Oct.28,1912, Wm. J.Rich Exr.				, 19
Countersigned W. W. Mortimer.				, 19
	For Commissioner		For Commissioner.	
Notice of Allowance	Oct. 31	, 1912		, 19
Final Fee Cash $20	Nov 5	, 1912		, 19
" " Cert.		, 190		, 19
Patented	December 3			, 1912

Associate Attorney O. E. Duffy & Son, Attorney Marion-&-Marion-
612 F St., N.W. Montreal-
Washington, D.C. Canada-

Name

Serial Number

Patent No.

Date of Patent

183,677

MAIL ROOM
DEC 3 1903
U.S.PATENT OFFICE

Case 1 183,677

DIV. 37. PAPER NO. 1

PETITION and POWER.

To the Commissioner of Patents,

UNITED STATES of AMERICA.

Your Petitioner Johann Harmatta Engineer, a subject of the King of Hungary residing at Szepesvaralja, in the Kingdom of Hungary prays that Letters Patent of the United States be granted to him for the Improvements in Electric Welding set forth in the annexed specification:

And he hereby appoints Messrs Marion and Marion (J.A.Marion & J.Wilfrid Marion)of Montreal, Province of Quebec, Canada, and Washington, D.C., U.S.A., his Attorney with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign his name to the drawings, to receive the Letters Patent when issued, and to transact all business in the Patent Office connected therewith.

Signed at Budapest, Hungary this 5th day of November, 1903

Johann Harmatta

Address Communications to
MONTREAL OFFICE

1356

Specification.

To all whom it may concern:

Be it known that I, Johann Harmatta, Engineer, a subject of the King of Hungary, residing at Szepesvaralja, in the Kindom of Hungary, have invented new and useful "Improvements in Electric Welding", of which the following is a specification.

My invention relates to a process of and apparatus for manufacturing metal articles of all kinds, in particular those of the thinnest sheet metal, by direct electric welding. The new process consists in one of the electrodes (or both of them) not only serving to feed the current, but also being employed for exercising a more or less strong pressure either before and during the period of supplying the electric current, or only at the moment of this supply, at the place at which the welding is to be done. The member which feeds the electricity is thus at the same time the tool, and in this manner the most favorable con-

Canceled-per Sub.-Spec.-May-14,-1904.

Sub. K[1]

ditions of working possible are secured, since, as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough.

According to none of the present known electric welding processes are the articles to be welded firmly pressed together during the welding operation by one or both electrodes, for the purpose of favoring welding. Hitherto either no pressure has been exerted at all, or it has been exercised at a certain distance from the place of welding, or at all events not centrally direct upon the electrodes pressing on the place to be heated. In short, hitherto direct electric welding pressure has never been exercised by means of the electrodes located in the direction of the current directly above the surface or point being welded.

For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place of welding by the aid of any of those technical means which are suitable for producing or transmitting pressure; e.g., with a press either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power.

In the accompanying drawing

Fig. 1 is a view illustrating the welding of

two metal sheets of equal thickness, intermittently or at certain spots only.

Fig. 2 is a front elevation and

Fig. 3 a side elevation of a device which may be employed for continuous welding, the pressure being exerted by roller electrodes, whereby the advancing series of single points of the seam to be welded is united to a whole with a minimum consumption of current.

Fig. 4 illustrates the method of welding the longitudinal seam of a cylindrical or conical hollow article according to my new process.

Fig. 5 is a side elevation of a welding device (also illustrated in part in Fig.1) according to which the pressure is exercised by pin shaped electrodes, the form of which may be suited to the particular purpose in view, and which may be adapted to work on the smallest possible surface of contact.

Fig. 6 shows two forms which may be adopted for the ends of the contacting electrodes.

As Fig. 1 shows, the two sheet metal or other bodies, the edges of which lie upon each other, are introduced between the two electrodes a b. Of the latter the one, somewhat prior to welding or only during the welding operation, is pressed upon the other, as the arrow shows; or both electrodes may be caused to exert pressure on the objects to be welded.

For continuous welding of longitudinal, cross and circular seams, the device shown in Figs. 2 and 3 of the drawing may be advantageously employed.

In the two conductors c d (Fig.3), forked members e f, making intimate contact with the conductors, are introduced, each furnished with a removable roller electrode g and h; or, if desired, only the lower roller electrode, for instance, may be capable of being removed. Or the lower or upper electrode may be formed as movable roller and the other electrode forms a stationary conductor.

The roller g of the upper conductor c is keyed to an axis i carrying a spur wheel k to which the motion of a suitably mounted hand-wheel l can be transmitted by means of a spur wheel m. Or the hand-wheel may be mounted directly on the shaft g, without the use of any intermediate gear-wheels. Or the axis i may have on the other end also a spur or bevel wheel, or pulley or the like for driving the roller electrode g, should it be desired to automatically advance the object being welded by means of motor power. The purpose of the hand-wheel is to accelerate or decrease the speed of rotation of the roller g, as may be required, and in general to actuate the roller by hand for any purpose. The axis i may, of course, be caused to move slower or faster in the case of mechanical power, by any other suitable means. The

upper part of the fork carrying the electrode roller g is here shown as constituting a toothed rack n, in which engages a pinion p carried by the conductor c by means of a ring-holder o. The pinion p is keyed to the axis q, which carries a hand lever r at its outer end. By raising or depressing the lever r, the upper roller electrode g may be separated from or advanced towards the lower roller electrode h. Furthermore by raising or depressing the forked piece f in the conductor d the lower removable roller h may be adjusted higher or lower.

If now the ends of the objects to be welded are introduced between the two roller electrodes g h and the circuit closed, continuous welding may be undertaken, that is to say an uninterrupted welded seam made, whereby the upper rotary roller electrode g may be pressed with any required degree of pressure upon the lower stationary (or rotary) roller electrode h, so that the two ends of the material to be welded are firmly connected with each other.

Instead of the objects to be welded being introduced gradually between the electrodes, the electric welding apparatus may be arranged to slide relatively to the stationary objects.

Thus if it is required to weld, for instance, sheets of metal only at particular places, the apparatus shown in Fig. 5 may be advantageously employed,

the electrodes a b having the form of pins. The lower electrode b is then inserted in the conductor d, whilst the upper electrode a is carried by an arm e by means of a hand-lever t carried by said arm e and can be turned on the shaft u in such manner that the points of the electrodes a b approach and recede from each other. If then two superposed sheet metal ends to be welded together are introduced between the electrodes, and the latter then firmly pressed together and the circuit closed, a small round, very sharply defined place of welding is caused which perfectly answers the purposes of a rivet. In this event, also, especially in the case of thin vessels which are not required to withstand great pressure, the pressure on the place of welding may act at the right moment be exactly regulated or kept within the proper limits.

11 words interlineated

Having thus described my invention, what I claim as new and desire to secure by letters patent is :-

1. The process of electric welding, consisting in employing the electrodes not only to conduct the current to the objects being welded, but also to exert a regulable pressure on the same, substantially as described.

2. An electrode apparatus for electric welding, comprising two electrodes between which the objects to be welded are introduced, and means whereby one of the

electrodes can be approached to and receded from the other, substantially as described.

3. An electrode apparatus for electric welding comprising two roller electrodes between which the objects to be welded are introduced, and means for pressing the electrodes to the work, substantially as described.

4. An electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, means for pressing the electrodes to the work, and means for rotating one or both of the rollers for the purpose of advancing the work in its path between the electrodes, substantially as described.

In Witness whereof I have hereunto signed my name this 5th day of November, 1903, in the presence of two subscribing witnesses.

Johann Harmatta

Witnesses :

Carl Becker

F. LaGuardia

A f f i r m a t i o n.

UNITED STATES CONSULATE;
BUDAPEST, HUNGARY.

Johann Harmatta, the above named petitioner being duly affirmed, deposes and says that he is a subject of the King of Hungary, and resident of Szepesvaralja, in the Kingdom of Hungary, and that he verily believes himself to be the original, first and sole inventor of the Improvements in Electric Welding, described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof; or patented, or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application;

1364

or patented in any country foreign tothe United States on an application filed more than twelve months before this application; or in public use, or on sale in the United States for more than two years prior to this application, and that no application for patent for said improvement has been filed by himself or his legal representatives or assigns, in any country foreign to the United States, except as follows: Germany, March 24th, 1903; Sweden, October 12th, 1903; France, October 13th, 1903; Austria, October 14th, 1903; Denmark, October 14th, 1903; Hungary, Oct. 15th, 1903; Switzerland, October 16th, 1903; Belgium, October 16th, 1903

Johann Hamatta.

Affirmed to and subscribed before me this fifth day of November 1903.

Frank Dyer Chester

SEAL

M.S. 360
1903.

United States Consul.

Div. ..... Room No. 77 J 2—260

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 1

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., January 9, 1904.

MAILED * * *

Johann Harmatta,

C/o Marion & Marion,

Montreal, Canada.

Please find below a communication from the EXAMINER in charge of your application.

#183,677, filed Dec. 3, 1903, for Electric Welding.

F. I. Allen. Commissioner of Patents.

6—2031

The statements beginning in line 6, page 2, should be amended or canceled in view of the references to be hereinafter cited.

Division is required in this case as between claim 1 which is drawn to cover a process, and the remaining claims which cover an apparatus. Claim 1, however, does not appear to be a proper process claim but simply covers the functions of the apparatus. If this claim is retained in its present form the requirement for division will be insisted upon. The statement of invention should be made to conform to whichever subject matter is covered by the claims retained in the case.

Claim 2 is rejected on eachof the following patents:

Burton et al.,	486,626,	Nov. 22, 1892,
Burton,	647,694,	Apr. 17, 1900,
Anderson,	657,262,	Sept. 4, 1900,
Duncan,	660,152,	Oct. 23, 1900,
Perry,	670,808,	Mar. 26, 1901, Metal Working, Electric.

Claims 3 and 4 are rejected on Burton et al., cited. To apply the power directly to the shaft upon which the roller electrode is supported, does not involve invention.

W.J.S.

A. P. Kinnan Ex

13366

DIV. 37 PAPER NO. 2
Sub. Spec.

MAIL ROOM
MAY 14 1904
U.S.PATENT OFFICE

(PRINTED LETTER HEAD OMITTED)

MONTREAL,
May 10th, 1904.

IN THE UNITED STATES PATENT OFFICE, ROOM 107,
APPLICATION OF JOHANN HARMATTA,
ELECTRIC WELDING,
FILED DECEMBER 3,1903, SERIAL NO. 183,677. } AMENDMENT

HON. COMMISSIONER OF PATENTS,

WASHINGTON, D. C.

SIR:-

Referring to the Office action of January 9th, 1904, we hereby amend as follows:

Cancel the entire specification and claims with the exception of the preamble and signatures, and insert the following.

Sub. Spec.

May 14, 1904.

per A

The subject of my invention is a process of welding thin sheet metal by means of electricity.

As is well known, it is impossible, by means of the ordinary methods of electric welding, to produce a really sound seam between very thin metal from about two millimeters in thickness downward sheets, that is to say, a seam which is perfect at every part, without there being any fusing or burning away of the material being welded.

The reason of this I have ascertained to be as follows:-

On the ordinary systems of welding it is the practice at once to lead a current to the objects to be welded (such as iron bars, hoops, chain links, or the like), whereby, in consequence of the thinner or thicker layer of air, which is always present between the two objects, vigorous sparking occurs. There is, so to say, a line of sparks or an arc formed, which persists until the objects being welded have been brought to welding heat by the electric current, whereupon they are finally pressed together to effect the desired union.

This well-known method, therefore, does not really differ from the ordinary method of welding

at the fire, except that instead of the gases of combustion of the fuel, the electric current is employed to heat the bodies to be welded. Once the welding heat is reached, however, the final union of the bodies in either case is effected by mechanical pressure (pressing or hammering).

For the purpose of enabling my invention to be more readily understood, I will make reference to the accompanying drawing, in which

Fig. 1 is a sectional view illustrating the electric welding of two comparatively thick sheets on the ordinary system.

Erased per C

Fig. 2, is a like view showing what occurs when one of the sheets is thin.

per C

Fig. 1 is a section of portions of two thin sheets with an air-gap between them.

" Fig. 2 is a sectional view illustrating the employment of my new process in welding thin sheets.

" Fig. 3 is a like view showing the welding of the overlapping ends of two pieces of sheet metal.

" In known processes

" As Fig. 1 shows, the electrodes A B lie opposite each other, the sheets X, Z to be welded by the ordinary process being located between them. The sheets lie loosely upon each other, that is to say, they are not artificially pressed together, and the consequence is that, that they are separated by a layer of air 3.

If now the electric circuit is completed

through the two electrodes and the sheets, and if the layer of air 3 is sufficiently thick, that is to say, the air resistance sufficiently great, there will be no sparks or arc formed between the two plates for the time being. If, however, the sheets are approached, as is unavoidable for the purpose of final union by pressing, hammering, etc., as already explained, a time must arrive when the air resistance between the two sheets to be welded is no longer sufficiently great toprevent equalisation of the electricity at the two poles. Between the sheets, therefore, an arc or a line ofsparks will be formed, and will continue until intimate contact has taken place between the two sheets. If, as is shown in Fig.1, the sheets are relatively thick, the arc which is formed will be of no consequence, since the slight fusing away at 4 caused by the arc, or the sparks, will not be sufficiently deep to penetrate the thick material. In fact there is even an advantage in the action of the sparks or arc in the case in question, since the cross section of the material is altered, whereby the two sheets are, as it were, scarfed at the place of welding, that is to say, the two cross sections are dimished at the seam toapproximately the thickness of a single sheet, so that under certain conditions the two welded sheets have the same thickness at the joint as a single sheet.

1370

The case is altogether other when two thin sheets or articles are to be welded, or when a very thin object is to be welded to a thicker one, such as is shown, for instance, in Fig.2. In this Figure it is assumed that the thick sheet 2 (which, as explained with reference to Fig.1, is thick enough not to be penetrated completely by the arc at the point 4) is to be electrically welded to a very thin plate 5 by the ordinary process as above explained.

On the approach of the objects 2, 5, at a certain moment, in consequence of the penetration of the layer of air 3, fusing away takes place at 4, owing to the arcs or sparks, and this fusing will extend tosuch depth that, although, as as above explained, not injurious in the case of the sheet 2, it causes the thin sheet 5 to be completely perforated or burnt through. Thus the ordinary process of welding by means of an arc is quite impracticable with such thin sheets.

per A

The essential feature of my invention i s that from about two millimeters in thickness downward in welding thin sheets the formation of such an arc, or sparking distance, which proves so disastrous, is wholly avoided, whereby a perfectly sound welded joint between such bodies, or between a very thin body and a thicker object, is attained.

For the purpose of preventing the formation of the injurious arc, that is to say the sparking

distance, I first submit the superposed metal objects to be welded 5, 6 (Figs. 4 & 5) to a certain pressure, the amount of which will depend upon the nature of the said objects. This pressure I effect by means of the electrodes a b (Figs. 4 & 5) themselves, or with the aid of other suitable means. The purpose of this pressure is to bring into intimate contact the parts of the metal to be united, so that the layer of air between them is as far as possible expelled. In this manner the two parts to be welded are, as it were, mechanically connected to form a single homogeneous body. This is of great importance when the two very thin sheets are to be welded together. For, as is well known, thin sheets have always a more or less wavy form, so far as they have not been straightened in the process of manufacture so as to present a surface which is practically quite flat, such as is the case with thick sheets. Such thin sheets, therefore, unless submitted to mechanical pressure never lie close upon one another; on the contrary, in consequence of the waved form, large air-gaps 3 (Fig. 3) are left between them, so that if a current were led through them, it would aid sparking and the formation of arcs.

After the two metal objects have, therefore, been prepared in this way, that is to say, by the application of mechanical pressure caused to lie closely upon each other, without any air-gap, between

them, the electric circuit is closed, the mechanical pressure being still maintained.

At the place where the electrodes a b exert pressure, therefore, (Figs.4 & 5), that is to say, where the current is able to flow through the bodies to be welded without having to pass through a layer of air and form sparks, the metal is heated to welding heat. Immediately this temperature is reached, the continuous pressure effects the desired union, that is to say, welding of the two metal objects 5 and 6, without injury by perforation or burning, in the manner explained, having taken place, even if the sheets are extremely thin. It should be remarked that the pressure to be exercised on the bodies before and during welding, must be selected according to the thickness of the sheets, and can be adapted to suit the condition of the bodies for the time being. Thicker sheets or objects do not require so much pressure as thin ones because, as already explained, they have a more even, uniform shape and therefore when laid upon each other can be readily closed together, that is to say pressed so that no injurious air-gap is formed.

Since the essential condition is, that the two metal objects to be united are firmly pressed together before welding, in order that complete penetration of the thin body by the electric current may be avoided, it is obvious that with this process

not only two equally thin sheets, but a very thin sheet and a thicker metal object may be welded without danger of the former being burnt through.

Naturally the required super-ficial pressure may be exerted by only one electrode, or by both the electrodes.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:-

The process of electrically welding thin sheets and the like, consisting in applying pressure at the place of welding of the two superposed metallic objects to be united, for the purpose of effecting thorough superficial contact between them, and then, whilst maintaining the said pressure, heating the objects by passing an electric current through them, substantially as described.

Sub. A1

Cancel the drawing originally filed and substitute the one accompanying this specification.

REMARKS.

It is hoped that this amendment will place the application in condition for allowance.

RESPECTFULLY SUBMITTED,

Marion & Marion

ATTORNEYS.

M. / M.

1374

Div. 37 Room 19 J 2-200

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 3

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., August 10, 1904.

MAILED * * *

Johann Harmatta,

C/o Marion & Marion,

Montreal, Canada.

Please find below a communication from the EXAMINER in charge of your application,

#183,677, filed Dec. 3, 1903, for Electric Welding.

F. I. Allen, ~~xxxxxxxxxxxxxxxxxxxxxx~~
Commissioner of Patents.

This is in response to the communication filed May 14, 1904.

The claim is rejected on Blevins et al., 758,503, April 26, 1904, Metal heating and working, Welding, Processes.

A. F. Kinnan Ex

W. J. S.

1375

DIV. 37 PAPER NO. 4

Amd't. A.

Claims

MAIL ROOM
NOV 26 1904
U.S.PATENT OFFICE

J o h a n n H a r m a t t a

c/o M a r i o n & M a r i o n, Montreal,

C a n a d a .

"Improvements in Processes of Electric Welding".

Ser. No. 183677; filed Dec. 3, 1903.

Hon. Commissioner of Patents,

W a s h i n g t o n D. C.

Sir.-

Erase the claim and substitute the following:

A1
Sub. B

1. The process of electrically welding thin metallic sheets and the like, from about two millimeters in thickness downward, consisting in first pressing intimately together the two superposed metallic objects at the very point in which the welding joint is to be formed, and then, whilst maintaining the intimate pressure, heating the objects by passing an electric current through them exactly at said point, in which the welding is to be effected, substantially as set forth.

2. The process of electrically welding thin metallic sheets and the like from about two millimeters in thickness downward, consisting in superposing the metallic sheets and the like, exerting on said thin sheets and the like before and during the welding operation a pressure limited to a material point, and passing for a short moment a current also limited to said material point through said thin sheets and the like, substantially as set forth.

3. The process of forming seams with thin sheets and the like from about two millimeters in thickness downward, consisting in pressing together the parts to be welded in a series of points consecutively, and, whilst maintaining the pressure in said consecutive points, passing an electric current for a short moment exclusively through said points, substantially as set forth.

In sert "from about two millimeters in thickness downward" after "sheets" on page 1, line 6 from above, and on page 4, line 7 from below.

R e m a r k s :

The process described in the U.S.Patent No. 758,503 to B l e v i n s and W i t t a k e r differs essentially from the process forming the object of the present aplication No. 183,677. In the process of B l e v i n s and W i t t a k e r namely, the inventors intend to weld a great surface, for example

a whole annular surface or a seam, in one stroke. On the contrary, the applicant desires only to weld the parts together in material points, so that a seam is formed by a series of welded points. Now, in the process of B l e v i n s and w i t t a k e r an enormous amount of current is necessary, so that the latter process is not fit for practical purposes. On the contrary, the process of applicant is very economical and only necessitates a small amount of current, because the heating at the place to be welded is still limited to a material point. Further, in the process of B l e v i n s and W i t t a k e r, owing to the great amount of current used, not only the surfaces to be welded, but also the neighbouring places are heated, so that a great electrical resistance is produced, which increases during the heating, as stated in page 2, line 20 and 21 of the specification, Consequently, B l e v i n s and W i t t a k e r are obliged to use a current regulator (variable resistance or rheostat) in order to be able to gradually increase the current during the welding operation, so that a complicated plant is necessary. Now, in the process of applicant, the use of a current regulator or rheostat is not necessary, because no great change in the electrical resistance takes place during the welding. A change in the strength of current is only necessary when other materials or sheets than before are intended to be welded, but during the welding operation the strength of the current used remains constant.

Furthermore, in the process of B l e v i n s and W i t t a k e r the inventors cannot have taken in consideration that, when thin metallic sheets from about two millimeters in thickness downward are to be welded together, it is absolutely necessary that the surfaces to be welded be in intimate contact, before the electrical current being led in. However, it is quite impossible to press together in one stroke two great surfaces (for example annular surfaces) so perfectly that no small hollow places at all remain, which, as is well known, always give rise to the production of small electrical arcs and consequently to a fusing away or burning through of the thin material at the welding place. Therefore, applicant before the welding operation proper affords a very intimate contact between the superposed objects to be welded, but only in material points, several consecutive points forming a line in the case of seams. Now, as B l e v i n s and W i t t a k e r produce the contact between relatively great surfaces and not only in points, a fusing away or burning through of the thin metallic sheets must always take place, inasmuch as the regulation of the strength of current, that is the fact of letting in a stronger current during the welding, is of a dangerous or injurious character, that is, is often connected with a spoiling or burning through of the thin materials. For welding together thin metallic sheets a quite determined temperature is necessary, which must not

be exceeded, and the heating must only last a short moment, or else the material is fused away or burnt through. In a few words for welding together thin sheets, the heating must be limited to a point and to a very short moment, if really practical results are to be obtained, and the process of applicant is based upon these considerations.

In order to show the favourable results obtained with the new process the applicant is ready to have the process demonstrated and experiments made before the Examiner at the Patent Office in Washington D.C.

An allowance of the new claims or a notice telling if experiments are thought to be necessary is requested.

Very respectfully,

Marion & Marion

Div. 37 Room 10 J 2-200 Paper No. 5

Address only "The Commissioner of Patents, Washington, D. C." and not any official by name.

In communications regarding this application always give the serial number, date of filing, title of invention and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., March 30, 1905.

MAILED

Joham Harmatta,

C/o Marion & Marion,

New York Life Bldg.,

Montreal, Canada.

Please find below a communication from the EXAMINER in charge of your application.

#183,677, filed Dec. 3, 1903, for Electric Welding.

F. I. Allen.

Commissioner of Patents.

This is in response to the amendment filed Nov. 26, 1904.

The claims are rejected on Thomson, 444,928, Jan. 20, 1891, Metal heating and working, Welding, or Thomson, 496,019, April 25, 1893, Metal heating, Soldering. To make the electrodes of any desired size is a mere matter of degree and does not involve invention.

W.J.S.

A. F. Kirman Ex

MAIL ROOM
NOV 17 1908
U.S.PATENT OFFICE

DIV. 37, PAPER NO. 6
Amendt B

J o h a n n H a r m a t t a,
c/o M a r i o n & M a r i o n, Montreal, Canada.
"Improvements in Processes of Electric Welding,"
Ser. No.183677, filed Dec. 3rd, 1903. ROOM 107.

Hon. Commissioner of Patents,
W a s h i n g t o n D.C.
Sir:----------

Responsive to the Official action of March 30th, 1908, in the above entitled application, amendment is hereby made as follows.

The applicant does not merely make the electrodes of a suitable size in order to adapt the same to the welding of sheets of very thin material (from about two millimeters in thickness downward), but by his method of welding such sheets of very thin material (from about two millimeters in thickness downward) he solved a problem which until now was considered as quite insoluble.

The U.S. Patent No.496,019 but relates to an improved method of producing soldered joints. Now, as in the process forming the object of the present invention no solder or uniting metal is used, the process described in the U. S. specification 496019, according to the opinion of applicant, cannot be opposed with right to the invention's object.

Further, the method described in the U. Specification No.444928 quite differs from the process forming the object of the present application. In the method disclosed in said U. S. specification No.444928 there is no question of affording a quite intimate contact between very thin sheets of iron, before the electric current is led to said sheets so as to weld the same together. In said method forming the subject matter of the U. S. patent No.444928 the pressure is only used in order to complete the welding process after the heating of the materials has taken place, but, exactly like in the ordinary welding with the use of a smithy fire, no pressure is exerted upon the sheets or the like at the very first stage of the process. On the contrary, in the process of applicant the pressure is in advance with regard to the welding action of the electric current from the beginning and also during the whole duration of the process.

Furthermore, it is quite certain that never welding trials with very thin sheets of metal - for example of 0.3 mm thickness - have been effected according to the process of the U. S. patent No.444928. If such trials had been made by Thomson before the application of his U. S. Patent some hints as to the absolute necessity of intimately pressing together plates of very thin metal from the beginning before the welding operation proper should have given in said U.S. specification No.444928, because, if one does not

proceed in this way, a burning through of the thin materials to be welded is unavoidable. It is true that Thomson has provided pressing means, but he does not use said means in the same manner as applicant and besides not for pressing together very thin metal sheets from about two millimeters thickness downward.

The inventor was occupied during quite a number of years with the electric welding and tried to weld together very thin sheets also with the help of the principles stated in the U.S.Patent 444928, but he obtained no practical results. Sometimes only an apparently good welding was obtained, but in the majority of cases the thin materials were burnt through and showed holes like a sieve, said holes being produced by electric sparks generated between the metallic surfaces in imperfect contact, and if a welding of such thin sheets could be obtained at all, the material was very much weakened at the place welded, so that said materials could not be used for practical purpose.

Only after long and repeated experiments the inventor, which during its trials found that a heating of the thin materials before the welding operation proper, that is before the leading in of the electric current, must be avoided under all circumstances, discovered a way or method which permits a welding together of such thin sheets being effected with absolute certainty and reliability i. e. without a failure being possible.

It is quite true that with the devices of Thomson the eventual possibility existed to work in the same manner as applicant, but as a matter of fact nobody has worked in the same way as applicant and no one before applicant was able to weld so very thin metal sheets together with absolute reliability, that is without a burning through or damaging of the very thin metallic sheets being possible.

It is quite remarquable that in all the specifications cited by the United States Patent Office there is only question of the electric welding of objects which can also be welded in an ordinary smithy fire, but in said former specifications absolutely nothing is said about the electric welding of very thin sheets of metal which can also not be welded in the fire of a smithy. Therefore the applicant is entitled to believe that no one before him devoted his attention to the welding of thin sheet of metal from about two millimeters in thickness downward, specially on an industrial scale. Consequently, nobody before the applicant was able to discover the fact than in welding very thin metallic sheets, the pressure must still be in advance with regard to the welding.

Besides, please strike the former claims and substitute the following, which are exactly limited with regard to the processes and objects already known:

Sub. C[1]

1. The process of electrically welding thin metallic sheets and the like, from about two millimeters in thickness

downward, which cannot be welded in the fire of a smithy, consisting in first pressing intimately together the two superposed metallic objects at the very point, in which the welding joint is to be formed, and then, whilst maintaining the intimate pressure, heating the objects by passing an electric current through them exactly at said point, in which the welding is to be effected, substantially as set forth.

2. The process of electrically welding thin metallic sheets and the like from about two millimeters in thickness downward, which cannot be welded in the fire of a smithy, consisting in superposing the metallic sheets and the like, exerting on said thin sheets and the like before and during the welding operation a pressure limited to a material point, and passing for a short moment a current also limited to said material point through said thin sheets and the like, substantially as set forth .

3.The process of forming seams with thin sheets and the like from about two millimeters in thickness downward, which cannot be welded in the fire of a smithy, consisting in pressing together the parts to be welded in a series of points consecutively, and, whilst maintaining the pressure in said consecutive points, passing an electric current for a short moment exclusively through said points, so as to keep the pressing action in advance of the electric heating during the whole welding operation, substantially as set forth.

13565

Favourable reconsideration and an early allowance is requested.

Very respectfully

Marion & Marion

Attorneys for applicant.

Montreal, CANADA,

November 15th, 1905.

6. M./F.

Div. 37 Room 107

2-200

Paper No. 7

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant

1387

J

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., December 1, 1905.

MAILED

Johann Harmatta,

C/o Marion & Marion,

N.Y. Life Bldg.,

Montreal, Canada.

Please find below a communication from the EXAMINER in charge of your application

#183,677, for Electric Welding, filed Dec. 3, 1903.

F. I. Allen

Commissioner of Patents.

This is in response to the amendment filed Nov.17,1905.

Figures 1 and 2, which are for the purpose of illustrating what is old in the art, should be canceled and the description accordingly revised,- ex parte Wadsworth, 92 O.G., 1898. The description should be confined to applicant's process of welding, and not to a discussion of prior processes and their disadvantages.

The last paragraph on page 2, page 3, and the first two paragraphs on page 4, should all be canceled.

The expression "from about two millimeters in thickness downward", introduced by amendment in the description and claims, should be canceled as it involves a departure from the original disclosure.

In the claims the expression "which cannot be welded in the fire of a smithy" should be canceled as it is in the form of a negative limitation; further, it defines no property of the material definitely.

In regard to claim 3, the word "exclusively" involves new matter and is also inaccurate. The subject matter of this claim has not been shown or described.

The claims are all rejected on the patents to Thomson, of record. These patents clearly disclose applicant's process

of welding. As described in patent 444,928, the plates to be welded are pressed together by means of the screw S, thus forming an electrical contact between them, the electric current is then turned on for the purpose of heating the plates and forming a weld between them,- see the description in lines 84 to 94, page 1 of said patent.

Rule. A. F. Kinnan Ex

Serial No. 183677 Paper No. 8.

Revocation of Power of Atty.

Filed Mar. 23, 1906

Revocation of Power of Attorney.

To the Commissioner of Patents:

The undersigned having, on December 3rd 1903 appointed Mr. M a r i o n of M o n t r e a l

his attorney to prosecute an application for letters patent, which application was filed on December 3rd 1903 for an improvement in "Electric Welding" (serial number 183677), hereby revokes the power of attorney then given.

Signed at , in the county of and State of , this day of 19

Johann Harmatta

1390

Serial No. 183,677 Paper No. 9

Power of Attorney.

Filed Mar. 23, 1906.

Power of Attorney.

To the Commissioner of Patents:

The undersigned having, on December 3rd 1903 made application for letters patent for an improvement in "Electric Welding" (serial number 183677), hereby appoints A. C. Hugh Duffy (O. E. Duffy & Son) Mr. O. E. Duffy of Washington, D.C.

in the County of and State of , his attorneys with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

Signed at , in the county of, State of , this day of , 1[illegible]

Johann Harmatta

ADDRESS ONLY THE COMMISSIONER OF PATENTS WASHINGTON, D. C.

Serial No. 183677 I per No.9
2-069

1301

E.E.G. DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

March 26, , 1906

You are hereby informed that YOUR POWER OF ATTORNEY HAS BEEN REVOKED in the matter of the application of Johann Harmatta

for Letters Patent for an IMPROVEMENT IN Electric Welding

No. 183,677 Filed December 3, 1903

Very respectfully,

F. I. Allen

Commissioner.

Marion & Marion,
N. Y. Life Bldg.,
Montreal, Can.

1302

ADDRESS ONLY
THE COMMISSIONER OF PATENTS
WASHINGTON, D. C.

2—089

DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE.
WASHINGTON, D. C.

E.E.G.

March 26, 1906

You are hereby informed that YOUR POWER OF ATTORNEY HAS BEEN ~~REVOKED~~ ACCEPTED in the matter of the application of Johann Marmatta

for Letters Patent for an IMPROVEMENT IN Electric Welding

No. 183,677 Filed December 3, 1903

Very respectfully.

F. I. Allen. ~~xxxxxxxxxxxxxxxxxxxxx~~

Commissioner.

O. E. Duffy & Son,
612 F St. N.W.,
Washington, D. C.

13393

O. E. DUFFY & SON,
PATENTS
612 F Street, N.W.
WASHINGTON, D. C.

DIVISION 37, Paper No. 11
MAY 18 1906 C
U. S. PATENT OFFICE.

AMENDMENT.

Room 107.

Johann Harmatta.

Electric Welding.

Filed Dec. 3, 1903.

Ser. No. 183,677.

Hon. Com. of Patents.

Sir:-

Please amend the above named application as follows:

Replying to Official letter of December 1, 1905, amendment is made as follows:

Cancel Figures 1 and 2.

Cancel first 5 lines of page 2 of specification.

In lines 6, 8 and 10, page 2 change the numerals "3", "4" and "5" to 1, 2 and 3 respectively.

In line 12, page 2 change "As Fig. 1 shows" to In known processes.

Same line cancel "a b".

1394

Johann Harmatta. #183,677.

In line 13, page 2 cancel "1.2"

In line 17 page 2 cancel "3".

In line 20, page 2 cancel "3".

In line 31, page 2 cancel " as is shown in Fig. 1".

In last line page 2 cancel "at 4".

Cancel second and third paragraphs of page 3.

In line 4, page 4 change "5, 6 (Figs. 4 and 5)" to Figs. 2 and 3.

In line 7, page 4 change " 4 and 5" to 2 and 3.

In line 22, page 4 change "3" to 1.

In line 3 from bottom of page 4 change "4 and 5" to 2 and 3.

1395

Johann Harmatta. $183,677.

Cancel the claims and substitute:

Canceled per D

C1

1: The process of electrically welding thin metallic sheets and the like consisting in applying suitable electrodes on the metallic objects at the very point at which the welding joint is to be formed, then causing said electrodes to exert a pressure on the metallic objects sufficiently to press the metallic objects intimately together at the point at which the welding joint is to be formed, then heatingthe metallic objects by passing an electric current through said electrodes and through the metallic objects, maintaining the pressure of said electrodes on the metallic objects during the passage of the electric current through the electrodes and metallic objects.

R E M A R K S.

The numerals of the Figures on the drawings will be changed to agree with the specification.

Very respectfully,

O. E. Duffy & Son

Attys. for Applicant.

13367

37 Room 107 2-260 P Paper No. 12

Address only "The Commissioner of Patents, Washington, D. C." and not any official by name.

A communication responding to this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., June 7, 1906.

MAILED * * *

Johann Harmatta,

C/o O.E. Duffy & Son,

Washington, D.C.

Please find below a communication from the EXAMINER in charge of your application

#183,677, filed Dec. 3,1903, for Electric Welding.

F. I. Allen

Commissioner of Patents.

This is in response to the amendment filed May 18, 1906.

The changes directed to the description as given in the second page of the amendment filed May 18,1906, have not been entered as the proper places for the changes indicated are not found in the description.

The requirements noted in lines 4 to 12, of Office letter Dec. 1, 1905, are repeated. The figure numbers of the remaining figures should be corrected.

In claim 1" and the like" is objected to as alternative and indefinite. See ex parte Caldwell & Barr 120 O.G. 2525.

The word "objects" throughout the claims should be changed to -sheets- to correspond with line 2. The claim is rejected on Thomson, 496,019, or Thomson, 444,928, both of record.

J.F.H.

A. F. Kinnan Ex.

DIVISION 37, Paper No.

PAPER NO. 13

AMENDMENT. D DEC 3 1906

U.S.PATENT OFFICE.

PATENT OFFICE,
DEC 3 1906
DIV. 16, FILED.

Room 107.

J o h a n n H a r m a t t a.

" E l e c t r i c W e l d i n g."

c/o O. E. D u f f y & S o n.

Filed: Dec. 3, 1903,

Ser.No.183677.

Hon. Commissioner of Patents,

Sir :

Replying to Official Letter of June 7th, 1906, amendment is made by substituting the enclosed description and claim to the former ones.

Cancel Figures 1 and 2 on the drawing.

R e m a r k s.

In accordance with the requirements of the Official Letter of December 1st 1906 the actual description is confined to applicant's process of welding and all parts of the former description objected to in said Official Letter have been canceled.

In the claim the words "and the like" and the words "Objects" have been changed throughout to -sheets-.

It is thought that the object of the claim is patentable, as the same relates to a series or combination

1.

of single steps not disclosed in the patents to Thomson 496019 and 444928. In the patent to Thomson there is no question of the exerting of a quite intimate pressure at the very point in which the welding joint is to be formed, this being absolutely necessary for example when thin metallic sheets are to be welded together in a series of points consecutively.

Favourable reconsideration and early allowance is requested for.

Very respectfully,

O. E. Duffy & Son

The subject of my invention is a process of welding thin metallic sheets by means of electricity.

As is well known, great difficulties have hitherto been experienced in electrically welding thin metallic sheets and even such a welding was quite generally considered as being impracticable. The thin metallic sheets were still damaged and even burnt through, because sparking could never be avoided. Now, by my improved process I completely overcome the mentioned difficulties.

My process consists in applying suitable electrodes on the metallic sheets at the very point at which the welding joint is to be formed, then causing said electrodes to exert a pressure on the metallic sheets sufficiently to press the metallic sheets intimately together at the point at which the welding joint is to be formed, then heating the metallic sheets by passing an electric current through said electrodes and through the metallic sheets, and finally maintaining the pressure of said electrodes on the metallic sheets during the passage of the electric current through the electrodes and metallic sheets.

For the purpose of enabling my invention to be

1,100

more readily understood, I will make reference to the accompanying drawing, in which

Fig. 1 is a section of portions of two thin sheets with an air-gap between them.

Fig. 2 is a sectional view illustrating the employment of my new process in welding thin metallic sheets.

Fig. 3 is a like view showing the welding of the overlapping ends of two pieces of sheet metal.

Supposing that thin metallic sheets 5 and 6 (Fig. 1) intended to be welded together by means of electrodes arranged opposite each other loosely lie upon each other or are not subjected to a rational pressure, they still assume at some points air gaps between them, as represented in Fig. 1 in a somewhat exaggerated manner for the sake of easier understanding. If now the electric current is completed through the two electrodes and the sheets, an arc or a line of sparks will be formed as a consequence of the air gap existing between the two thin metallic sheets. However, under the above circumstances, the arc or line of sparks still exerts an injurious action by producing a fusing of the thin metallic sheets to a certain depth or even a complete perforating or burning through of the same.

Now, the essential advantage obtained with my improved process is that in welding thin metallic sheets the formation of an arc or spark, which proves disastrous, is wholly avoided, whereby a perfectly sound welded joint be-

tween two thin metallic sheets, or between a thin metallic sheet and a thicker object, is attained.

For the purpose of preventing the formation of the injurious arc, I submit the superposed thin metallic sheets to be welded (Fig.2 and 3) to a quite intimate pressure at the very point at which the welding joint is to be formed, the amount of said pressure depending upon the nature of the said sheets. This pressure I effect by means of the electrodes a b (Fig. 2 and 3) themselves, or with the aid of other suitable means. The purpose of this intimate pressure is to expel as far as possible the layer of air between the two thin metallic sheets. In this manner the two parts to be welded are, as it were, mechanically connected to form a single homogenous body. This is of great importance when two very thin sheets are to be welded together, for, as is well known, thin sheets have always a more or less wavy form, as far as they have not been straightened in the process of manufacture so as to present a surface which is practically quite flat, such as is the case with thick sheets. Such thin sheets therefore, unless submitted to a heavy mechanical pressure never lie close upon one another; on the contrary, in consequence of the waved form, air gaps are left between them, so that if a current were led through them, it would aid sparking and the formation of arcs.

After the two metal objects have, therefore, been prepared in this way, that is to say, by the application

of a rational mechanical pressure caused to lie quite closely upon each other, without any air-gap between them, the electric circuit is closed, the mechanical pressure being still maintained.

At the place where the electrodes a b exert pressure therefore (Figs. 2 and 3), that is to say, where the current is able to flow through the bodies to be welded without having to pass through a layer of air and form sparks, the metal is heated to welding heat. Immediately this temperature is reached, the continuous pressure effects the desired union, that is to say, welding of the two thin metallic sheets 5 and 6, without injury by perforation or burning, in the manner explained, having taken place, even if the sheets are extremely thin. It should be remarked that the pressure to be exercised on the bodies before and during welding, must be selected according to the thickness of the sheets, and can be adapted to suit the condition of the bodies for the time being. Thicker sheets or objects do not require so much pressure as thin ones because, as already explained, they have a more even, uniform shape and therefore when laid upon each other can be readily closed together, that is to say pressed so that no injurious air gap is formed.

Since the essential condition is, that the two metal objects to be united are firmly pressed together before welding at the very point at which the welding joint is to be formed, it is obvious that with this process not only two equally thin sheets, but a very thin sheet and

a thicker metal object may be welded without danger of the former being burnt through.

Naturally the required superficial pressure may be exerted by only one electrode, or by both the electrodes.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is :

The process of electrically welding thin metallic sheets, consisting in applying suitable electrodes on the metallic sheets at the very point at which the welding joint is to be formed, then causing said electrodes to exert a pressure on the metallic sheets sufficiently to press the metallic sheets intimately together at the point at which the welding joint is to be formed, then heating the metallic sheets by passing an electric current through said electrodes and through the metallic sheets, and maintaining the pressure of said electrodes on the metallic sheets during the passage of the electric current through the electrodes and metallic sheets.

1203

Div. XVI. Room 10 C.E.H. 2-200

Paper No. 14.

Address only "The Commissioner of Patents, Washington, D. C." and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., December 15, 1906.

MAILED * * *

Johann Harmatta,

C.o C. E. Duffy & Son,

612 F. Street, N. W.,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of your application No. 783,677, filed December 3, 1903, for Electric Welding.

F. I. Allen

Commissioner of Patents.

This action is in response to amendment of December 3, 1906.

The claim is rejected on both Thompson, 496,019, and Thompson, 444,928, both of record, and also on Blevins, 758,503, of record, attention being directed to lines 29 to 31 of page 1 of this patent and also to lines 5-6 of the claim thereof.

Campbell
Examiner, Division XVI.

F.T.W.

APPLICATION ROOM
DEC 4 1907
U.S.PATENT OFFICE

PAPER NO. 15
AMENDMENT. E

Room 109.

J o h a n n H a r m a t t a,

"Electric Welding"

c/o O. E. D u f f y & Son,

Filed Dec. 3, 1903.

Ser. No.183677.

PATENT OFFICE,
DEC 5 1907
DIV. 16, FILED.

Hon. Commissioner of Patents

Sir:

Replying to Official Letter of Dec. 15th, 1906 amendment is made by substituting the following 2 claims to the former one;

Erased
Per G

1.) The process of electrically welding a plurality of metal sheets, consisting in exerting a heavy mechanical pressure by means of electrodes on said sheets, thereby flattening, smoothing out and eliminating all irregularities and intimately pressing said sheets E1 together, whereby air space and interstices between said sheets are eliminated, subsequently passing an electric F current through the sheets thus softening and welding same while maintaining the heavy pressure of the electrodes on the sheets.

2.) The process of electrically welding thin metallic sheets, consisting in applying suitable electrodes on the metallic sheets at the very point at which the welding joint is to be formed, then causing said electrodes to exert a maximum pressure on the metallic

sheets sufficiently to press the metallic sheets intimately together at the point at which the welding joint is to be formed, then heating the metallic sheets by passing an electric current through said electrodes and through the metallic sheets, and maintaining the maximum pressure of said electrodes on the metallic sheets during the passage of the electric current through the electrodes and metallic sheets.

R e m a r k s .

It is a matter of fact that very great difficulties have formerly been experienced in electrically welding together very thin metallic sheets. Even the welding together of such thin metallic sheets was considered as quite impossible before the applicant obtained a full success in that direction.

The tenor and gist of applicants invention, as clearly stated in the specification forming a part of this specification consists in welding thin sheets of metal such as used in kitchen ware by pressing said sheet together between electrodes with very great or maximum pressure, this pressure being so great that all irregularities and unevenness will be pressed smooth and flattened out of the sheets, and that all air spaces and interstices between the sheets will be eliminated. Then a current is passed in a known manner between the electrodes, whereby the metal is softened and welding takes place, as said very great pressure is maintained.

The new process composed of a certain number of definite steps is clearly specified in the 2 claims filed to-day, and in view of the fact that an effect

1-2017

which before the present application was considered as impossible or inadmissible is obtained, the process forming the object of the present application is thought to be patentable.

Favourable reconsideration of the case is requested for.

Very respectfully,

O. E. Duffy & Son

M./F.

1408

Div. 16 Room 109 — 2—260 — Paper No. 16

Address only "The Commissioner of Patents, Washington, D. C." — FJR — All communications relating this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., Jan. 6, 1908.

MAILED * * *

Johann Harmatta,

C/o O. E. Duffy & Son,

612 F St., N. W., Washington, D.C.

Please find below a communication from the EXAMINER in charge of ~~the~~ your application for Electric Welding, filed Dec? 3, 1903, Ser. No. 183,677.

E. B. Moore

Commissioner of Patents.

In response to amendment of Dec. 4, 1907:

The views of the drawing need to be renumbered to read 1, 2 and 3.

In claim 1, line 8, "trough" should be through.

Both claims are rejected on the references of record. Thomson 496,019, discloses the use of any desired pressure exerted by the electrodes before, during and after the passage of the welding current.

Backus

Wm A Kinnan

Examiner, Div. 16.

1409

Serial No. 183,677 Paper No. 17

"P".

APPLICATION ROOM
JAN 6 1909
U.S.PATENT OFFICE

U.S.PATENT OFFICE,
JAN 7 1909
DIVISION 26

Room 109

J o h a n n H a r m a t t a,

c/o O.E. D u f f y & Son,

" E l e c t r i c W e l d i n g ",

Filed Dec. 3, 1903.

Ser. No. 183677.

Hon. Commissioner of Patents,

S i r :-

Replying to Official Letter of January 6th, 1908, I beg to state the following :

Kindly have at my costs the drawings altered "P" by the Chief Draughtsman, so that the drawings read 1, 2 and 5;

In claim 1, line 8, substitute through &c for "trough".

As in the Official Letter only the Patent No.496019 to T h o m s o n is referred to it is thought that the former references cited by the Patent Office are now overcome.

Now, the U.S.Patent No.496019 cited in the Official Letter relates only to a soldering method and not to a welding method as in the present application. Therefore the U.S. patent No.496019 according to the belief of applicant cannot be considered as an anticipation of the object of the invention applied for.

The conditions of working and results to be obtained are quite different in both cases and the process of applicant is to be considered as a very useful im-

provement in welding processes in view of the prior state of the art.

On account of the above statements favourable reconsideration and early allowance is requested for.

Respectfully

O. E. Duffy & Son

1411

Div 26 Room 103
Address only "The Commissioner of Patents, Washington, D. C."

2-260

Paper No. 18.
In communications respecting this application should give the serial number, date of filing, and title of invention.

PH

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., February 9, 1909.

MAILED * * *

Johann Harmatta,

Care, O. E. Duffy & Son,

612 F Street, N. W., Washington, D. C.

Please find below a communication from the ***EXAMINER*** *in charge of the application of* your, for Electric Welding, filed Dec. 3, 1903, Serial No. 183,677.

E. B. Moore,
Commissioner of Patents.

In response to amendment of January 6, 1909.

The term "rational pressure" used in line 12, page 2, and in line 1, page 4, is not understood.

The specification now in the case contains matter for which there is no warrant in the original specification. For example, Fig. 1 and the matter relating thereto involve a departure from the original disclosure. This figure and the matter relating thereto must be canceled, and the specification revised in such a manner as to restrict it to matter illustrated or described in the original disclosure.

Claim 1 is rejected as unwarranted by the original disclosure.

In lines 4 and 7 of claim 2, should not "welding" be changed to welded?

Claim 2 is rejected as presenting nothing patentable over Thomson, 444,928, or 496,016, or Blevins, 758,503, all of record.

It is thought that if there is any patentable matter in this case it resides in the securing of the sheet metal parts together by means of the small round, sharply defined place of welding which answers the purpose of a rivet, as is set forth on page 6 of the original specification.

H L

A. P. Shaw Exr

1412

Paper No. 19
Amend't. "G"

APPLICATION ROOM
JAN 27 1910
U.S.PATENT OFFICE

U.S.PATENT OFFICE,
JAN 28 1910
DIVISION 26

Room 105

J o h a n n H a r m a t t a

c/o O. E. D u f f y & Son

" E l e c t r i c W e l d i n g "

Filed: Dec. 3, 1903,

Ser. No. 183677.-

Hon. Commissioner of Patents,

S i r :-

Replying to Official Letter of February 9th, 1909 amendment is made by substituting the enclosed description, claims and drawing to the former ones.

"G"

R e m a r k s :

The present description, claims and drawing are limited to the subject-matter which in the last Official Letter is deemed patentable by the U. S. Patent Office. Great care has been taken not to describe anything which was not illustrated or explained in the original disclosure.

For the matter which is considered by the U. S. Patent Office as involving a departure from the original disclosure it is intended to file in the next time a divisional application.

It is thought that the two claims submitted at present are allowable. The 1st claim is more specially directed upon the new process or method of uniting the sheet metal parts together. The 2nd claim relates to the

several steps of said process or method.

As applicant strictly complied with the official requirements favourable reconsideration and early allowance is requested for.

V e r y R e s p e c t f u l l y,

O. E. Duffy & Son

R. H. V.

Enclosures:

1 new description
with claims,
1 new drawing.

M./P.

The subject of my invention is a process or method of welding thin metallic sheets at particular places or spots by means of electricity, said process being intended for the manufacture of metal articles of all kinds, specially those of the thinnest sheet metal, such as kitchen-hardware, household vessels or the like, by direct electric welding.

My new process or method of electrically welding thin metallic sheets essentially consists in securing the sheet metal parts together by means of a small round, defined place of welding which perfectly answers the purpose of a rivet.

I preferably carry out my process by means of the following steps consisting in introducing the sheet metal parts to be welded between electrodes having the form of pins, pressing said electrodes firmly together centrally i.e. at the very place at which the welding is to be effected and closing the circuit, whereby the said small round, very sharply defined place of welding is obtained.

For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place of welding by the aid of any of those tech-

nical means which are suitable for producing or transmitting pressure, for example with a press either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power,

In the accompanying drawing.

Fig. 1 is a view illustrating the welding effected according to my new process of two thin metallic sheets of equal thickness, intermittently or at certain spots only.

Fig. 2 is a side elevation of a welding device (also illustrated in part in Fig. 1) according to which the pressure is exercised by pin shaped electrodes, the form of which may be suited to the particular purpose in view, and which may be adapted to work on the smallest possible surface of contact.

Figs. 3 and 4 show two forms which may be adopted for the ends of the contacting electrodes.

In order to effect the welding only at particular places or certain spots, the sheet metal or other bodies, the edges of which lie upon each other, are introduced between the two electrodes a b, as represented in Fig. 1 which as an example shows the welding of two metal sheets. Of the latter the one during the welding operation is pressed firmly upon the other in the direction of the arrow.

For said welding operation the apparatus provided with pin-shaped electrodes a b shown in Fig. 2 may be advantageously employed. The lower electrode b is inserted

-1-

in the conductor c, whilst the upper electrode a is carried by an arm d and by means of a hand-lever e carried by said arm d can be turned on the shaft f in such manner that the points of the electrodes a b approach or recede from each other. If then two superposed sheet metal ends to be welded together are introduced between the electrodes, and the latter then firmly pressed together and the circuit closed, a small round, very sharply defined place of welding is caused which, as already stated above, perfectly answers the purposes of a rivet. In this event, also, especially in the case of thin vessels which are not required to withstand great pressure, the pressure on the place of welding may at the right moment be exactly regulated or kept within the proper limits.

In Figs 3 and 4 the electrodes a^1 b^1 and a^2 b^2 respectively are given special shapes which answer to particular purposes.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is :-

Erased Per H

1. The process of electrically welding thin metallic sheets, consisting in securing the sheet metal parts together by means of a small round, defined place of welding which answers the purpose of a rivet.

per K Per-H-

1 2. The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes having the

Per H

form-of-pins, pressing said electrodes firmly together and closing the circuit, whereby the specified small round, very sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth.

Add H[1]

Div. 26 Room 10

Address only: The Commissioner of Patents, Washington, D. C.

2—260

Paper No. 20

All communications respecting this application should give the serial number, date of filing, and title of invention.

VCC

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

(Copy mailed applicant.) WASHINGTON, D. C., March 22, 1910.

MAILED * * *

Johann Harnatta,

c/o O. E. Duffy & Son,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of the application of your

for Electric Welding, filed Dec. 3, 1903, Serial No. 183,677.

E. B. Moore

Commissioner of Patents

In response to amendment of Jan. 27, 1910.

Claim 1 should state the steps necessary to produce the weld.

Claim 2 is objectionable for the reason that it includes in a process claim the specific shape of the apparatus used to perform the process.

Claim 1 is rejected on Bernados et al., 363,320, May 17, 1887, (219-15).

Except as noted claim 2 appears to be allowable.

Claims 1, 5, 6, 16, 17, 18, 19 and 20 of the patent to Rietzel, 928,791, July 20, 1909, (219-10) are suggested to applicant in accordance with the provisions of Rule 96 for the purposes of interference. He is required to make these claims on or before May 3, 1910, otherwise he will be considered to have disclaimed the subject matter thereof in accordance with Rule 96 and the claims now in the case will be rejected as covering nothing patentable over such disclaimer.

Van Nest A. P. Shaw Exr

183,677

1419

APPLICATION ROOM
MAR 30 1910
U.S.PATENT OFFICE

Paper No. 21

"H"

U.S.PATENT OFFICE
MAR 31 1910
DIVISION 26

A M E N D M E N T .

Room 105.

Johann Harmatta.

Electric Welding.

Filed Dec. 3, 1903.

Ser. No. 183,677.

Hon. Com. of Patents.

Sir:-

Please amend the above named application asfollows:

H

Cancel claim 1.

Change numeral of claim "2" to 1 and add the following claims:

2: The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

3: The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

4: The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

H[1]

5: Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

6: Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

7: Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

8: Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

H[1] 9: A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaces and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

sert I[1]

10: 13 The process of electrically welding thin metallic sheets consisting in securing together directly overlapping metallic sheets by means of a small defined place of welding which answers the purpose of a rivet.

11: 14 The process of electrically welding thin metallic sheets consisting in overlapping the metal sheet parts to be welded and securing said parts together by means of small defined places of welding only at points.

12: 15 The process of electrically welding thin metallic sheets, which consists in directly overlapping the metallic sheets to be welded, introducing said overlapping metal sheet parts between pin-shaped electrodes, and passing through the electric current, whereby the metal parts at the place of welding become secured at a sharply defined place.

Johann Harmatta. Ser. No. 183,07

In claim 2, lines 3 and 4 cancel "having the form of pins".

REMARKS.

The claims in the patent to Rietzel, #928,701 designated by the Examiner have been inserted into the case as requested.

Respectfully,

O. E. Duffy & Son

Attys. for Applicant.

Div. 26 Room 105 | 2-200 | Paper No. 22

Address only the Commissioner of Patents, Washington, D. C.

All communications respecting this application should give the serial number, date of filing, and title of invention.

VCC

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D. C., April 11, 1910.

MAILED * * *

Johann Harmatta,

c/o O. E. Duffy & Son,

Washington, D. C.

Please find below a communication from the EXAMINER in charge of your application of, for Electric Welding, filed Dec. 3, 1903, Serial No. 183,677.

E. B. Moore

Commissioner of Patents.

In response to amendment of Mar. 30, 1910.

Claims 11, 12 and 13 are each rejected on Benardos et al., of record.

Claims 1 to 9, inclusive, may be allowed.

The interference heretofore referred to will not be postponed pending reply to this rejection but will be declared at once. Further action by applicant, responsive to the rejection of claims 11, 12 and 13, may be postponed until the termination of the interference.

Van Nest

A. P. Shaw Exr

1424

2—079

INTERFERENCE.

Interference No. 31792 *Paper No.* 23

Name, Johann Harmatta

Serial No. 183,677

Title, Electric Welding

Filed, Dec. 3, 1903

Interference with Adolph F. Rietzel.

DECISIONS OF

Primary Examiner, ... *Dated,* .....

Ex'r of Interferences, Favorable *Dated,* Aug. 7/12.

Board, ... *Dated,* .....

Commissioner, ... *Dated,* .....

REMARKS:

This should be placed in each application or patent involved in interference in addition to the interference letter by Primary Examiner.

2—079

Forwarded from Div. 26 to Examiner of Interferences.

2—213. VCC

Paper No. 24

[INTERFERENCE.]

Apr. 14, 1910.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

(Copy mailed applicant.) WASHINGTON, D. C.,

190

Johann Harmatta,

c/o O. E. Duffy & Son,

Washington, D. C.

U.S.PATENT OFFICE.
INTERFERENCE DIVISION
APR 26 1910
MAILED.

Please find below a copy of a communication from the Examiner concerning your application for "Electric Welding", filed December 3, 1903, Serial No. 183,677.

Very respectfully,

Room No. 105.

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

31792

E. B. Moore.

Commissioner of Patents.

Your case, above referred to, is adjudged to interfere with others, hereafter specified, and the question of priority will be determined in conformity with the Rules.

The statement demanded by Rule 110 must be sealed up and filed on or before the 27 *day of* JUN 1910, 190..., *with the subject of the invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is*

INVENTION.

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

3. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

4. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

5. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only

1425

each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

6. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

7. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

8. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

The interference involves your application above identified, and

An application (Patent No. 928,701, Pat'd July 20, 1909) for "Uniting the Component Parts of Composite Sheet Metal Structures", filed by Adolph F. Rietzel, whose post office address is Lynn, Mass., whose attorneys are Townsend & Decker of 141 Broadway, New York City, and whose assignee is the Thomson Electric Welding Company, of Lynn, Mass, a corporation of Maine.

The relation of the counts of the interference to the claims of the respective parties is as follows:

Counts:	Rietzel:	Harmatta:
1	1	2
2	5	3
3	6	4
4	16	5
5	17	6
6	18	7
7	19	8
8	20	9

If the interference is decided against Harmatta all the claims now in the case will be rejected as not patentable over the issue.

Van Nest A. P. Shaw Exr

1-27

U.S.PATENT OFFICE,
JAN 7 1911
DIV. 3.

Serial No. 183677
Paper No. 25
Amendment. I

A M E N D M E N T .

Room 107.

Johann Harmatta.

Electric Welding.

Ser. No. 183,677.

Filed Dec. 3, 1903.

Hon. Com. of Patents.

Sir:-

Please amend the above named application as follows:

Insert the following claims 10, 11 and 12.

er J 10: The herein described method of uniting two separate pieces of metal at a number of distinct or separate spots separated from one another by well defined areas of no union, I[1] consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots celed r K until the union is effected.

11: The herein described method of uniting two pieces of metal consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a per J spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to the spot or spots.

12. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces consisting in pressing the two pieces together and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot

per J so as to produce an isolated spot or spots of union or spots of desired union leaving distinct or well defined areas in which the pieces are not welded together.

Respectfully,

O. E. Duffy & Son

Attys. for Applicant.

APPLICATION ROOM
JUN 8 1911
U.S.PATENT OFFICE

U.S.PATENT OFFICE,
JAN 8 1911
DIV. 3.

Serial No. 183677
Paper No. 26 -
Amendment. J.

A M E N D M E N T .

Room 107.

Johann Harmatta.

Electric Welding.

Filed Dec. 3, 1903.

Ser. No. 183,677.

Hon. Com. of Patents.

Sir:-

Please amend the above named application as follows:

In reading over the claims submitted in the last amendatory paper filed in this case certain clerical errors are found and the claims are hereby amended as follows:

In claim 10 of the last paper filed, line 1, cancel the word "separate".

In claim 11, line 5, change "spors" to spots.

In claim 12, line 6, after the word "union" insert, so as to produce an isolated spot or spots of union.

Respectfully,

O. E. Duffy & Son

Attys. for Applicant.

Div. 3 Room 179 — 2-200 — Paper No. 27

Address only The Commissioner of Patents, Washington, D.C.

communications respecting this application should give the serial number, date of filing, and title of invention.

Jun. 12, 1911. DEPARTMENT OF THE INTERIOR

RAJ UNITED STATES PATENT OFFICE

WASHINGTON

U.S.PATENT OFFICE, INTERFERENCE DIVISION JUN 13 1911 M A I L E D.

Johann Harmatta,

C/o O. E. Duffy and Son,

612 F St., N.W. Washington, D.C.

Rietzel v Harmatta. # 31792.

Please find below a communication from the EXAMINER in charge of the application of your

183,677, filed Dec. 3, 1903:----

Electric Welding.

31792

E. B. Moore. *Commissioner of Patents.*

The following counts have been added to the above entitled interference:---

9. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

10. The herein described method of uniting two pieces of metal, consisting in passing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

11. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

The preliminary statement required by Rule 110, as to the added counts only, should be filed on or before AUG 14 1911

The relation of the added counts of the interference to the claims of the respective parties is as follows:----

Counts	Rietzel	Harmatta
9	2	10
10	3	11
	4	12
11		

Wm J Rich

Examiner, Division 3.

DOCKET CLERK
AUG 2 1912
U.S.PATENT OFFICE

183,677 -- 28

Honorable Commissioner of Patents.

Sir:-

In the matter of the pending application for patent of Johann Harmatta, Serial No. 183,677, filed December 3rd 1903, ELECTRIC WELDING, we hereby revoke any and all associate powers of attorney which we may have given in this application and any and all powers to inspect, or other papers which we may have given in this application.

Respectfully,

O. E. Duffy & Son

Attys. for Applicant.

July 30th 1912.

Div. 3 Room 175 2—260 Paper No. 29

Address only "The Commissioner of Patents, Washington, D. C." All communications respecting this application should give the serial number, date of filing, and title of invention.

WJR.RAJ

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON Oct. 17, 1912

MAILED * * *

Johann Harmatta,

C/o O. E. Duffy and Son,

City.

Please find below a communication from the EXAMINER in charge of your application of,

183,677, filed Dec. 3, 1903)-----

Electric Welding.

E. B. Moore.

Commissioner of Patents.

Applicant having prevailed in his interference with Rietzel (for record see interference file NO. 31,792), this case has been given further consideration.

The subject-matter of the invention as set out in the first paragraph of the present specification, should be amplified in view of the fact that the claims also cover the article produced by the process claimed.

The word "round", on line 10, page 1 and line 9, page 3, is questioned, since it is not thought the place of welding would necessarily be of circular form.

The description of Fig. 1 is thought to be somewhat involved and it is suggested that it be rewritten.

It is also suggested that "suited", line 14, page 2 be replaced by adapted.

In connection with the claims, an additional examination of the art has been made and the following patents are noted as apparently meeting the terms in which certain of the claims are phrased.

Thomson,	375,022,	Dec. 20, 1887,	219 - 10,
Moxham,	496,890,	May 9, 1893,	" "
Perry,	576,069,	Jan. 26, 1897,	(X. Ref) same class,
Payne and Driven	584,120,	Jun. 8, 1897,	same class,
Kleinschmidt,	616,436,	Dec. 20, 1898,	" "
Brown and Morse,	645,066,	Mar. 13, 1900,	" "
Perry,	670,808,	Mar. 26, 1901,	" "

Thomson (this being one patent from a number showing an analogous operation) discloses the welding together at their ends of two bars A and B, by means of an electric current, the bars being pressed together during the welding.

Moxham shows a similar method of welding bars (rails) at their ends.

These two patents appear to anticipate the terms of claim 2, the expression "at spots only", without some qualification, being of sufficient breadth to refer to ends, and pressure and heating current being localized in said spots (ends).

For a similar reason Payne and Driven and Brown and Morse appear to meet the terms of this claim in their disclosure of the welding of two pieces of metal one on the other. It is noted that in these patents carbon electrodes are employed which would negative the idea of much pressure but as in "welding" it is necessary to employ pressure it is considered that pressure must be employed during the operation. These two patents cover and claim the same thing, they having been involved in an interference.

Perry, 576,069 discloses the electric welding of the joints of a wire fence. It would seem that a wire fence could properly be considered as an article of metal and whether the parts welded be joints of wires or small spots in sheets as in claims 2, 3 and 7, would be patentably immaterial. Accordingly,

1435

this patent appears to meet the terms of such claims.

Fig. 6 of Perry, 670,808, appears to meet the terms of claim 2.

The Kleinschmidt patent, showing the joining of splice bars to rails by electric welding at raised portions (spots?) b, appears to be an anticipation of claims 1 to 12 inclusive.

Inasmuch as the claims of this case have previously been considered allowable and those noted above have been contested in an interference with a patent wherein similar claims were granted, a formal rejection is not now made, since upon consideration and explanation it may appear that the references cited have been formally or informally considered in the examining division earlier having jurisdiction of the applications and held not pertinent. It is thought best, however, to note them in order that if the claims do differ from the patents, such differentiation may appear in the record.

R

Wm. J. Rich

Examiner, Division 3.

APPLICATION ROOM
OCT 25 1912
U.S.PATENT OFFICE

Serial No. 183677
Paper No. 30-
Amendment. K

Div. 3
Room 175

October 23rd 1912.

Hon. Commissioner of Patents,
Washington, D. C.

U. S. PATENT OFFICE,
OCT 26 1912
DIV. 3.

Sir:

In the matter of the application of Johann Harmatta for Electric Welding filed Dec. 3rd, 1903, Serial No. 183,677;

In reply to the Office letter dated October 17th, 1912, please erase all previous specifications, claims and amendments thereto and substitute the following:

K1

My invention relates to the manufacture of metal articles of all kinds and consists in a novel method of fastening the component parts together by the process of electric welding and also in the new article produced thereby.

The invention affords a cheap and practical substitute for riveting and is particularly useful in fastening plates or sheets of metal to one another inasmuch as it may be employed for the thinner sheet metal, such for instance as is used for sheet metal ware like vessels or household utensils.

In general terms the invention may be stated to consist in fastening the pieces together by an electric weld at one or more distinct or well-defined spots, each of small area or extent, in their juxtaposed or opposite plane faces by the application of pressure and heating current localized in such spots, and in the special method of localizing the heating and the pressure in the spot or

spots as hereinafter described and specified more particularly in the claims.

It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces. It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces.

A weld formed according to my invention is distinguished however from such prior welds, among other things, by the fact that the opposed surfaces available for uniting the pieces together and in which it might be possible to form a weld are welded in a small spot or spots only, the spot or spots being surroudned by comparatively large areas of opposed surfaces in which no weld is made.

By the term "electric welding" as used herein I mean that wellknown process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure, and I disclaim those processes of fastening pieces of metal together in which the parts are heated and practically melted down by an

electric arc generated on the back of the piece by "drawing" an arc by means of the electrode, as well as other processes in which the welding heat is generated externally and electrically in a resistance material and is imparted to the work by heat conduction from said resistance material in contact with the work.

While it is possible, consistently with my invention, to localize the desired pressure and heating current at the desired distinct small spot or area in various ways, this may be accomplished conveniently by pressure applied over the spot and itself localized on the back of the plate or sheet immediately over the small spot in which the union is to be made by using a tool pressed against the work by its end and formed at such end so as to engage the work by a spot or area of small extent and serving, likewise, by preference, as the electrode which feeds the current into the work to heat the same. The member which feeds the electricity being thus at the same time the tool, in this manner the most favorable conditions of working possible are secured, since, as is wellknown, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough.

For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place of welding by the aid of any of those technical means which are suitable for producing or transmitting pressure, e.g., with

a press either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power, or by other means.

In the accompanying drawings, Fig. 1 illustrates the application of my invention to the welding of two plates or sheets overlapped so as to be superposed or have a portion only of their meeting faces presented to one another and by the welding of the opposed surfaces intermittently or at certain spots only through applying pressure at a point or spot on the back of a plate over the spot of desired union.

Fig. 2 is a side elevation of a welding device, also illustrated in part in Fig.1. It shows the construction of the means which may be employed for pressing the electrode against the work by manual power.

Figs. 3 and 4 show forms which may be adopted for the ends of the electrodes where they engage the work.

Electrodes a, b are by preference both formed to engage the work by a small area of contact and may each be adapted to work on the smallest possible surface contact, so as to localize the pressure and the path of the heating current in a very small spot only. The lower electrode b may be inserted in a conductor c and forms one pole of the heating current, while the upper electrode is carried by an arm d, which can be turned on a shaft

f by means of a hand lever e, and is connected with the opposite pole of the circuit feeding current to the work. By this means the electrode a may be caused to approach and recede from the electrode b and to exert pressure upon the back of the two superposed sheet-metal pieces introduced between the electrodes for the purpose of welding. The two superposed metal plates to be welded together being in position between the electrodes as indicated in Fig. 1, the operation is performed by firmly pressing the electrode a down upon the work with any required degree of pressure by means of the lever e and the circuit is closed by any suitable means, thus producing a flow of heating current through the work itself substantially localized therein so as to bring the same to the necessary welding temperature at the desired spot only, and the application of pressure by the use of the lever e will result in the welding of the plates together in the small sharply defined place of welding at the point or spot desired, which perfectly answers the purpose of a rivet. In this event, especially in the case of thin vessels which are not required to withstand great pressure, the pressure on the place of welding may at the right moment be exactly regulated or kept within the proper limits. Obviously, the operation may be repeated upon thework at another point if it is desired to join the pieces at a number of spots only.

The time or duration of pressure and heating and the amount of pressure as well as the volume of current for effecting the weld can be

readily determined by experiment for different sizes or thicknesses of metal and as well understood in the art of electric welding to which my invention relates.

The operation is completed with the cutting off of the flow of current in the usual manner practiced in the art of electric welding and the withdrawal of pressure when desired to permit the work to be withdrawn from position between the electrodes.

Sheet metal work made by this process is readily distinguished from that made by prior processes by the comparative absence of burning, roughening or disintegration of the material on the back of the plate when the operation is carefully conducted. It further possesses the advantage that there are no rivet heads to mar the finish of the back or outer surfaces of the plate.

I am aware that it has been before proposed to fasten two sheets of metal together by electrically welding them over practically the whole area of their opposed or lapping surfaces.

I am also aware of patent to H. F. A. Kleinschmidt No. 616,436, dated December 20th, 1898, and do not wish to be understood as claiming anything disclosed in said patent.

What I claim as my invention is:-

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to

produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

7. The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes, pressing said electrodes firmly together and closing the circuit, whereby a small, sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth.

8. The method of electrically welding two plates or sheets of metal together face to face between electrodes, consisting in restricting the area of contact of an electrode with said plates

to a spot, passing a heating electric current from said electrode to the co-operating electrode through said spot to heat the work to welding temperature and applying pressure to the work in line with said spot to effect a welding of one plate to the other.

9. The herein described method of producing a welding temperature in a small distinct spot or point of the opposed surfaces of two plates of metal, consisting in applying pressure at a point or spot only at the back of a plate coinciding with the desired point or spot of welding, while the plates are assembled face to face, to localize the flow of current in the required point or spot in the meeting surfaces and passing an electric current through the plates in the line of the applied pressure to bring the material to welding temperature at the spot of welding by the resistance of the work to the passage of such current.

10. The method of electrically welding a piece of sheet metal at a small distinct spot or point in its plane surface to the face of another piece of metal, consisting in applying pressure at a small point or spot on the back of the sheet to localize the pressure and electrical heating of the work at a spot of electrical contact in the opposed surfaces of said pieces beneath the point of applied pressure, and passing an electric current from one to the other at the said spot of localized electrical contact to produce a welding temperature at said spot and maintaining the localized pressure to effect a welding at said spot.

11. The herein described method of welding two pieces of sheet metal together by a weld at a small spot only of their opposed surfaces, consisting in applying pressure localized in a spot on the back of a sheet directly over the desired spot of union, while said sheet is assembled face to face with the opposite sheet and so as to localize the pressure and electrical heating in a spot in the meeting surfaces of the sheets, and effecting the weld by passing an electrical current from one sheet to the other through said spot in the line of the localized applied pressure, and by pressure applied in said line.

12. The method of electrically welding two pieces of sheet metal to one another, consisting in pressing the sheets together by pressure applied and localized in a distinct well-defined point or spot on the rear surface of asheet while passing an electric current through them in the line of the pressure, thereby localizing the path of the heating current from one to the other of the meeting surfaces of the sheets to cause the said sheets to be heated to welding temperature by the electric resistance of the work at said spot, and applying pressure localized over said spot whereby the pieces are welded together at a distinct well defined spot in their meeting surfaces answering the purpose of a rivet.

13. The method of electrically welding two plates of metal together face to face, consisting in pressing the plates together between two elec-

trodes one of which at least makes contact with the rear of a plate at a spot only, feeding a heating electric current into the plates by said electrodes to bring the plates to welding temperature by the heating effect due to the electrical resistance of the portion of the circuit containing said plates, and effecting an electric welding of one plate to the other at a spot beneath the electrode by the pressure of said electrode.

14. The herein described method of fastening two sheets of metal together at a distinct point or spot only in their plane meeting surfaces, consisting in pressing the sheets together and localizing the contact pressure of each upon the other at the said distinct spot or point, passing an electric current from one sheet to the other through said localized spot of contact pressure between them to bring the metal to welding temperature in said spot and thereupon completing the weld in the material so brought to welding temperature and uniting the pieces by a welded union at said spot only.

15. The herein described method of fastening two pieces or sheets of metal together at a spot only in their meeting surfaces, consisting in pressing them together at said spot, passing an electric current through said pieces or sheets at said spot to raise the same to welding temperature and applying welding pressure localized in the back of a sheet immediately over said spot to effect the weld.

16. The herein described method of welding two pieces of sheet metal together by pressing them to-

gether between electrodes engaging the surface of the sheets at a spot only and bringing the section of work between them to the welding temperature by its resistance to the passage of an electric current fed through the work by said electrodes.

17. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

18. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

19. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

20. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot

being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

21. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

REMARKS:

In reply to the official action dated October 17th, the applicant submits the above substitute specification and claims.

Some of the patents now cited by the Examiner were specifically cited in the Rietzel case against the allowance of many of the claims now submitted by applicant and the considerations made of record in the Rietzel application were evidently recognized by the Examiners having charge of that case as rendering those patents inapplicable. As to other patents which the present Examiner now cites for the first time, the same considerations apply forcibly. They were doubtless influential with the Examiner who acted on the Rietzel case and for this reason he did not cite these additional patents whose existence must have been known to him.

The specification as now drawn with its differentiating clauses clearly differentiates the invention from the references. However, we call

the attention of the Examiner to the facts submitted here below which, among many others that might be referred to, establish clearly that this applicant has made a definite advance in this art for which he is entitled to the protection of a patent.

The resemblance between the processes of welding disclosed in the Thomson and Moxham patents and that of applicant is, to say the least, extremely remote. In both those cases the patentees contemplate the formation of a weld not limited to a spot in the opposed or meeting surfaces but the formation of a welded union over substantially the whole area of the metal pieces taken in cross-section and on a line immediately back of the welded union. Welding according to those patents, is, in its essentials, a welding of the whole opposed areas or surfaces. Other patentees, in their attempt to weld plates of metal, followed out the suggestions of the Thomson patent and others in which an end welding of pieces is described, by attempting to weld practically the whole of the plane surfaces of the plates together. In neither case is there anything in the nature of a welding of juxtaposed or opposite faces of the pieces or plates at a "spot" in the ordinary acceptation of the term "spot" and as defined by the dictionary, nor in the sense of the term "spot" as defined in Harmatta's substitute specification submitted herewith. It seems to applicant that the term "spot" has no application whatever to the weld produced by the welding of two bars or pieces of metal end to end over substantially their whole cross-sectional area.

Regarding the Payne and Diven patent, it is quite clear that the patentees contemplated only the union of the plates by a lapped joint involving practically the whole area of the lapping surfaces. There is not a word in the patent about so limiting the area of heating of the metal that the welding temperature will be reached in only a spot in the opposed surfaces.

In the Brown & Morse patent there is likewise an entire absence of any disclosure indicating that the patentees contemplated anything but a union of the strips over practically their whole meeting or opposed surfaces. All the statements made in the specification are consistent with the idea that a union over the whole surface of the plate was the thing in view, as for instance, where the patentees speak of the welding of flat copper bonding strips directly to the rails of electric railways, in which case it is quite obvious that the union should be over the whole surface in order to afford the desired conductivity at the point of junction of the bond and rail.

Furthermore, the Brown & Morse as well as the Payne & Diven process is one in which the metal is brought to the welding temperature by an external source of heat conducted into the metal pieces from the back and which would necessarily diffuse itself over substantially the whole areas of the opposed pieces and so that the localization of the heating to a welding temperature in a spot in the opposed surfaces would be practically impossible.

Furthermore, it is apparent that a welding at a spot in the ordinary sense of the term "welding" as employed in this art is not practical with carbon electrodes, since the electrode, if shaped to exert pressure at a spot, would be extremely liable to break because of its fragile nature.

In short, the Brown & Morse method is not a true electric welding process in the sense of the term "electric welding" as ordinarily used in the art and as defined by this applicant in the body of the substitute specification herewith submitted.

In respect to the Perry fence patent, we can find nothing but a union of the elements of the structure over substantially the whole of the meeting surfaces. To say that there is a welding at spots only, seems to the applicant to employ the term out of its ordinary significance and to imply that the void spaces between the metal portions are to be considered as a part of the opposed surfaces to be welded, which obviously they are not.

The patent to Perry 670,808 presents a method that only apparently resembles applicant's invention and in substance is essentially different therefrom. There is no localization of the welding in a spot only of the opposed surfaces in which a welding might take place. So far as the balls are concerned, the welding contact is at the mathematical point at which the surfaces of two spheres may, geometrically considered, make contact with one another. It would be physically impossible to weld the balls at any other than such point of contact and parts immediately contiguous thereto, so that while in one sense and from a purely geometrical standpoint,

there is a spot at which the surfaces may touch, nevertheless in the practical sense of the welding of two pieces systematically limited to a spot only in their weldable opposed or meeting surfaces, the idea of applicant and the essence of his invention are totally absent. The same consideration applies with equal force to the mere welding of two crossing wires together at an intersection, provided it be possible to consider such welding, as disclosed in the Perry patent and practiced in actual fence welding, to be a welding in a spot in any sense rather than a substantial welding of all of the meeting sides of the wires where their sides lie against one another.

The Kleinschmidt patent does not disclose the idea of welding at a spot only in the ordinary sense of the term "spot". The Standard Dictionary defines "spot" thus:

1. A particular place of small extent; a definite locality; as, the spot where Columbus first landed.
2. Any small portion of a surface differing in color from the rest.
3. A minute piece or bit; particle; atom.

The patentee Kleinschmidt was dealing with large masses of metal and with a construction in which provision had been made to withstand extreme shearing strain.

For the purposes of the use of the finished production a weld across the whole face of the plate would be desirable, and this the patentee specifically aims at in the union at the place B Fig. 2. For other and specific purposes he modifies the shape of the projection b without idea or purpose of confining the extent of the weld to a "spot". It may be noted

that the cross-sectional view, Fig. 3, shows a welding across the whole face of the plate but independently of this suggestion or any inference to be drawn therefrom it is quite clear that if the weld were or could be confined to the areas represented by the projection b, said projections are so large that there would not be a welding in a "spot" in the usual sense of the term and consistently with what applicant has set out as his invention. To avoid any question, however, as to whether this patent should constitute a bar to the allowance in this case the applicant has specifically disclaimed the said patent by specific reference thereto in the body of his specification.

The above arguments are in conformity with those advanced at great length before the Principal Examiner, Mr. Rich, during numerous interviews had by one of the attorneys in this case, and it has been agreed by Mr. Rich, as the result of such interviews, that the above amendment places this case in condition for allowance.

Respectfully submitted,

JOHANN HARMATTA,

By

O. E. Duffy & Son

1454

ADDRESS ONLY THE COMMISSIONER OF PATENTS WASHINGTON, D. C.

K.O'D. 2-181 Serial No. 183,677.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON Oct. 31, 1912.

Johann Harmatta, Assor.

Sir: Your APPLICATION for a patent for an IMPROVEMENT in

Electric Welding,

filed Dec. 3, 1903, has been examined and ALLOWED.

The final fee, TWENTY DOLLARS, must be paid not later than SIX MONTHS from the date of this present notice of allowance. If the final fee be not paid within that period, the patent on this application will be withheld, unless renewed with an additional fee of $15, under the provisions of Section 4897, Revised Statutes.

The office delivers patents upon the day of their date, and on which their term begins to run. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will require about four weeks, and such work will not be undertaken until after payment of the necessary fee.

When you send the final fee you will also send, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR and TITLE OF INVENTION AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If you desire to have the patent issue to ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of FIVE CENTS EACH. The money should accompany the order. Postage stamps will not be received.

Final fees will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

Respectfully,

E. B. Moore.

Commissioner of Patents.

O. E. Duffy & Son,

Wash. D. C.

IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

$20.00 RECEIVED
NOV 5 1912 H.
CHIEF CLERK U.S.PATENT OFFICE

S-327.

1455

MEMORANDUM

FEE PAID AT UNITED STATES PATENT OFFICE.

(Be careful to give correct Serial No.)

Serial No. 133,677 Nov. 4, 1912

INVENTOR:

Johann Harmatta

PATENT TO BE ISSUED TO

Assignees-

NAME OF INVENTION, AS ALLOWED:

Electric Welding

DATE OF PAYMENT:

Nov. 4 - 1912.

FEE:

$20.00

DATE OF FILING:

Dec. 3 - 1903

DATE OF CIRCULAR OF ALLOWANCE:

Oct. 31 - 1912.

The Commissioner of Patents will please apply the accompanying fee as indicated above.

O. E. Duffy & Son

Attorneys

SEND PATENT TO

Attys.

1136

INTERFERENCE.

Interference No. 36709 *Paper No.* 31

Name, Johann Harmatta

Serial No. 183677

Title, Electric Welding

Filed, Dec. 3, 1903 - Patent No. 1046066 granted Dec.3,1912

Interference with S. Z. de Ferranti

DECISIONS OF

Primary Examiner, *Dated,*

Ex'r of Interferences, *Dated,*

Board, *Dated,*

Commissioner, *Dated,*

REMARKS:

This should be placed in each application or patent involved in interference in addition to the interference letter by Primary Examiner.

6—1900

Forwarded from Div. 3 to Examiner of Interferences.

2-218

Paper No. 32 [INTERFERANCE.]

Oct. 2, 1913

WLR/RAJ

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

U.S.PATENT OFFICE.
INTERFERENCE DIVISION
OCT 7 1913
M A I L E D.

O. E. Duffy and Son,

612 F St., N.W.

Washington, D.C.

Please find below a copy of a communication from the Examiner concerning the patent of Johann Harmatta, for Electric Welding, # 1046066, dated Dec. 3, 1912, (serial number 183,677 filed Dec. 3, 1903).

Paper No. 175

ADDRESS ONLY THE COMMISSIONER OF PATENTS WASHINGTON, D. C.

Very respectfully.

Thomas Ewing

Commissioner of Patents.

36709

The case, above referred to, is adjudged to interfere with others, hereafter specified, and the question of priority will be determined in conformity with the Rules.

The statement demanded by Rule 110 must be sealed up and filed on or before DEC 1 1913 *, with the subject of the invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is*

1. The hereinbefore described improved mathod of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

The interference involves your patent above identified, and an application for Electric Welding, filed by Sebastian Ziani de Ferranti, whose post office address is Grindleford Bridge, Sheffield, England, and whose attorneys are Spear, Middleton, Donaldson and Spear, Washington, D. C.

The relation of the counts of the interference to the claims of the respective parties is as follows:--

Counts	De Ferranti,	Harmatta,
1	6	1
2	7	2
3	8	3
4	9	4

W.R.

Wm. J. Rich
Examiner, Division 3.

1459

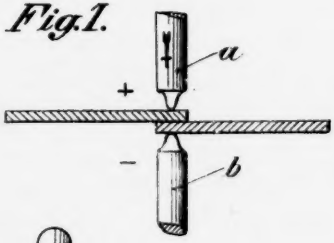
HARMATTA.

ELECTRIC WELDING.

APPLICATION FILED DEC. 3, 1903.

1,046,066. Patented Dec. 3, 1912.

Fig. 1.



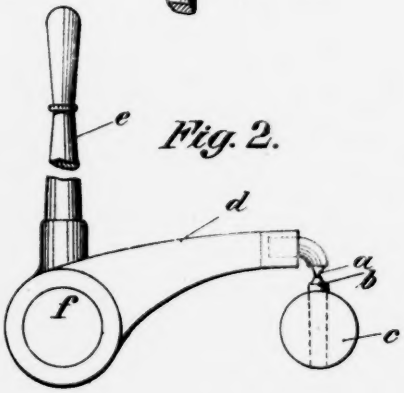


Fig. 2.

Fig. 3.



Fig. 4.



Witnesses.

P. P. Britt

E. C. Duffy

Inventor:

Johann Harmatta

by E. C. Duffy & Son

Attys.

1460

UNITED STATES PATENT OFFICE.

JOHANN HARMATTA, OF SZEPESVÁRALJA, AUSTRIA-HUNGARY, ASSIGNOR TO THOMSON ELECTRIC WELDING COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ELECTRIC WELDING.

1,046,066. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed December 3, 1903. Serial No. 185,677.

To all whom it may concern:

Be it known that I, JOHANN HARMATTA, engineer, a subject of the King of Hungary, residing at Szepesváralja, in the Empire of Austria-Hungary, have invented new and useful Improvements in Electric Welding, of which the following is a specification.

My invention relates to the manufacture of metal articles of all kinds and consists in a novel method of fastening the component parts together by the process of electric welding and also in the new article produced thereby.

The invention affords a cheap and practical substitute for riveting and is particularly useful in fastening plates or sheets of metal to one another inasmuch as it may be employed for the thinner sheet metal, such for instance as is used for sheet metal ware like vessels or household utensils.

In general terms the invention may be stated to consist in fastening the pieces together by an electric weld at one or more distinct or well-defined spots, each of small area or extent, in their juxtaposed or opposite plane faces by the application of pressure and heating current localized in such spots, and in the special method of localizing the heating and the pressure in the spot or spots as hereinafter described and specified more particularly in the claims.

It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces. It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces.

A weld formed according to my invention is distinguished however from such prior welds, among other things, by the fact that the opposed surfaces available for uniting the pieces together and in which it might be possible to form a weld are welded in a small spot or spots only, the spot or spots being surrounded by comparatively large areas of opposed surfaces in which no weld is made.

By the term "electric welding" as used herein I mean that wellknown process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure, and I disclaim those processes of fastening pieces of metal together in which the parts are heated and practically melted down by an electric arc generated on the back of the piece by "drawing" an arc by means of the electrode, as well as other processes in which the welding heat is generated externally and electrically in a resistance material and is imparted to the work by heat conduction from said resistance material in contact with the work.

While it is possible, consistently with my invention, to localize the desired pressure and heating current at the desired distinct small spot or area in various ways, this may be accomplished conveniently by pressure applied over the spot and itself localized on the back of the plate or sheet immediately over the small spot in which the union is to be made by using a tool pressed against the work by its end and formed at such end so as to engage the work by a spot or area of small extent and serving, likewise, by preference, as the electrode which feeds the current into the work to heat the same. The member which feeds the electricity being thus at the same time the tool, in this manner the most favorable conditions of working possible are secured, since, as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough.

For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place of welding by the aid of any of those technical means which are suitable for produc

ing or transmitting pressure, *e. g.*, with a press either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power, or by other means.

In the accompanying drawings, Figure 1 illustrates the application of my invention to the welding of two plates or sheets overlapped so as to be superposed or have a portion only of their meeting faces presented to one another and by the welding of the opposed surfaces intermittently or at certain spots only through applying pressure at a point or spot on the back of a plate over the spot of desired union. Fig. 2 is a side elevation of a welding device, also illustrated in part in Fig. 1. It shows the construction of the means which may be employed for pressing the elctrode against the work by manual power. Figs. 3 and 4 show forms which may be adopted for the ends of the electrodes where they engage the work.

Electrodes *a*, *b* are by preference both formed to engage the work by a small area of contact and may each be adapted to work on the smallest possible surface contact, so as to localize the pressure and the path of the heating current in a very small spot only. The lower electrode *b* may be inserted in a conductor *c* and forms one pole of the heating current, while the upper electrode is carried by an arm *d*, which can be turned on a shaft *f* by means of a hand lever *e*, and is connected with the opposite pole of the circuit feeding current to the work. By this means the electrode *a* may be caused to approach and recede from the electrode *b* and to exert pressure upon the back of the two superposed sheet-metal pieces introduced between the electrodes for the purpose of welding. The two superposed metal plates to be welded together being in position between the electrodes as indicated in Fig. 1, the operation is performed by firmly pressing the electrode *a* down upon the work with any required degree of pressure by means of the lever *e* and the circuit is closed by any suitable means, thus producing a flow of heating current through the work itself substantially localized therein so as to bring the same to the necessary welding temperature at the desired spot only, and the application of pressure by the use of the lever *e* will result in the welding of the plates together in the small sharply defined place of welding at the point or spot desired, which perfectly answers the purpose of a rivet. In this event, especially in the case of thin vessels which are not required to withstand great pressure, the pressure on the place of welding may at the right moment be exactly regulated or kept within the proper limits. Obviously, the operation may be repeated upon the work at another point if it is desired to join the pieces at a number of spots only.

The time or duration of pressure and heating and the amount of pressure as well as the volume of current for effecting the weld can be readily determined by experiment for different sizes or thicknesses of metal and as well understood in the art of electric welding to which my invention relates.

The operation is completed with the cutting off of the flow of current in the usual manner practiced in the art of electric welding and the withdrawal of pressure when desired to permit the work to be withdrawn from position between the electrodes.

Sheet metal work made by this process is readily distinguished from that made by prior processes by the comparative absence of burning, roughening or disintegration of the material on the back of the plate when the operation is carefully conducted. It further possesses the advantage that there are no rivet heads to mar the finish of the back or outer surfaces of the plate.

I am aware that it has been before proposed to fasten two sheets of metal together by electrically welding them over practically the whole area of their opposed or lapping surfaces. I am also aware of patent to H. F. A. Kleinschmidt No. 616,436, dated December 20th, 1898, and do not wish to be understood as claiming anything disclosed in said patent.

What I claim as my invention is:—

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and

passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

7. The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes, pressing said electrodes firmly together and closing the circuit, whereby a small, sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth.

8. The method of electrically welding two plates or sheets of metal together face to face between electrodes, consisting in restricting the area of contact of an electrode with said plates to a spot, passing a heating electric current from said electrode to the coöperating electrode through said spot to heat the work to welding temperature and applying pressure to the work in line with said spot to effect a welding of one plate to the other.

9. The herein described method of producing a welding temperature in a small distinct spot or point of the opposed surfaces of two plates of metal, consisting in applying pressure at a point or spot only at the back of a plate coinciding with the desired point or spot of welding, while the plates are assembled face to face, to localize the flow of current in the required point or spot in the meeting surfaces and passing an electric current through the plates in the line of the applied pressure to bring the material to welding temperature at the spot of welding by the resistance of the work to the passage of such current.

10. The method of electrically welding a piece of sheet metal at a small distinct spot or point in its plane surface to the face of another piece of metal, consisting in applying pressure at a small point or spot on the back of the sheet to localize the pressure and electrical heating of the work at a spot of electrical contact in the opposed surfaces of said pieces beneath the point of applied pressure, and passing an electric current from one to the other at the said spot of localized electrical contact to produce a welding temperature at said spot and maintaining the localized pressure to effect a welding at said spot.

11. The herein described method of welding two pieces of sheet metal together by a weld at a small spot only of their opposed surfaces, consisting in applying pressure localized in a spot on the back of a sheet directly over the desired spot of union, while said sheet is assembled face to face with the opposite sheet and so as to localize the pressure and electrical heating in a spot in the meeting surfaces of the sheets, and effecting the weld by passing an electrical current from one sheet to the other through said spot in the line of the localized applied pressure, and by pressure applied in said line.

12. The method of electrically welding two pieces of sheet metal to one another, consisting in pressing the sheets together by pressure applied and localized in a distinct well-defined point or spot on the rear surface of a sheet while passing an electric current through them in the line of the pressure, thereby localizing the path of the heating current from one to the other of the meeting surfaces of the sheets to cause the said sheets to be heated to welding temperature by the electric resistance of the work at said spot, and applying pressure localized over said spot whereby the pieces are welded together at a distinct well defined spot in their meeting surfaces answering the purpose of a rivet.

13. The method of electrically welding two plates of metal together face to face, consisting in pressing the plates together between two electrodes one of which at least makes contact with the rear of a plate at a spot only, feeding a heating electric current into the plates by said electrodes to bring the plates to welding temperature by the heating effect due to the electrical resistance of the portion of the circuit containing said plates, and effecting an electric welding of one plate to the other at a spot beneath the electrode by the pressure of said electrode.

14. The herein described method of fastening two sheets of metal together at a distinct point or spot only in their plane meeting surfaces, consisting in pressing the sheets together and localizing the contact pressure of each upon the other at the said distinct spot or point, passing an electric current from one sheet to the other through said localized spot of contact pressure between them to bring the metal to welding

temperature in said spot and thereupon completing the weld in the material so brought to welding temperature and uniting the pieces by a welded union at said spot only.

15. The herein described method of fastening two pieces or sheets of metal together at a spot only in their meeting surfaces, consisting in pressing them together at said spot, passing an electric current through said pieces or sheets at said spot to raise the same to welding temperature and applying welding pressure localized in the back of a sheet immediately over said spot to effect the weld.

16. The herein described method of welding two pieces of sheet metal together by pressing them together between electrodes engaging the surface of the sheets at a spot only and bringing the section of work between them to the welding temperature by its resistance to the passage of an electric current fed through the work by said electrodes.

17. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

18. Sheet metal work comprising pieces of sheet meal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

19. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

20. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

21. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

In witness whereof I have hereunto signed my name this 5th day of November, 1903, in the presence of two subscribing witnesses.

JOHANN HARMATTA.

Witnesses:
CARL BECKER,
T. LA GUARDIA.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

1464

1903

C O N T E N T S:

Print Apr. 5 1910

† Application_____papers.

1. Rejection Jan.9,1904
2. Sub. Spec. May 14,1904
3. Rejection Aug.10, 1904
4. Amd't-A- Nov.26,1904
5. Rejection Mar. 30, 1905
6. Amendt B Nov.17,1905
7. Rejection Dec. 1,1905
8. Revocation of Power of Atty.Mar. 23-06.
9. Power of Attorney - Mar. 23-06.
10. Notice of Rev. and Accept. Mar. 26/06
11. Amendt C May 18, 1906
12. Rejection June 7, 1906
13. Amendt D Dec. 3, 1906.
14. Rej. Dec. 15-1906.
15. Amendt E. Dec. 4-1907.
16. Rej. Jan. 6 - 1908.
17. Amdt. "F". Jan 6-1909
18. Rejection Feb. 9, 1909
19. Amdt. "G" Jan. 27, 1910
20. Rejections (cls sugg) Mar. 22, 1910.
21. Amend't. H Mar. 30, "
22. Rejection April 11, 1910
23. Intf. Card

APR 26 1910.

24. Intf.Letter xPat.No.928,701.
25. Amendment. I-Jan.7,1911.
26. Amendment. J-June 8-1911.
27. Intf. Letter JUN 13 1911
28. Revocation of Asso.Attys.Aug.2,1912
29. Letter Oct 17, 1912
30. Amendment. K- Oct.25, 1912
31. Intf data
32. Intf letter OCT 7 1913

T I T L E:

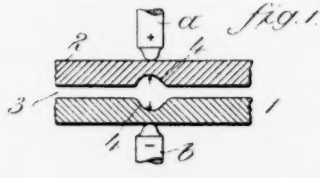
Improvement in Electric Welding — 21 Claims

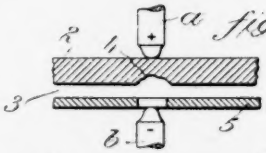
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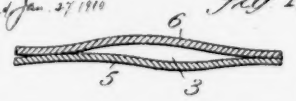
Ch'k 183 677 Sub. Drawing 185 677/47 DIV

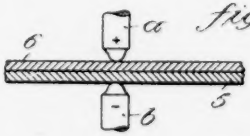
Canceled May 18 1906.

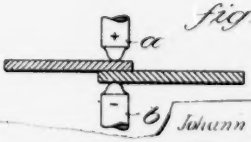




Canceled Jan. 27 1910







Witnesses:
A. M. Marsh
John F. Deufferwiel Jr.

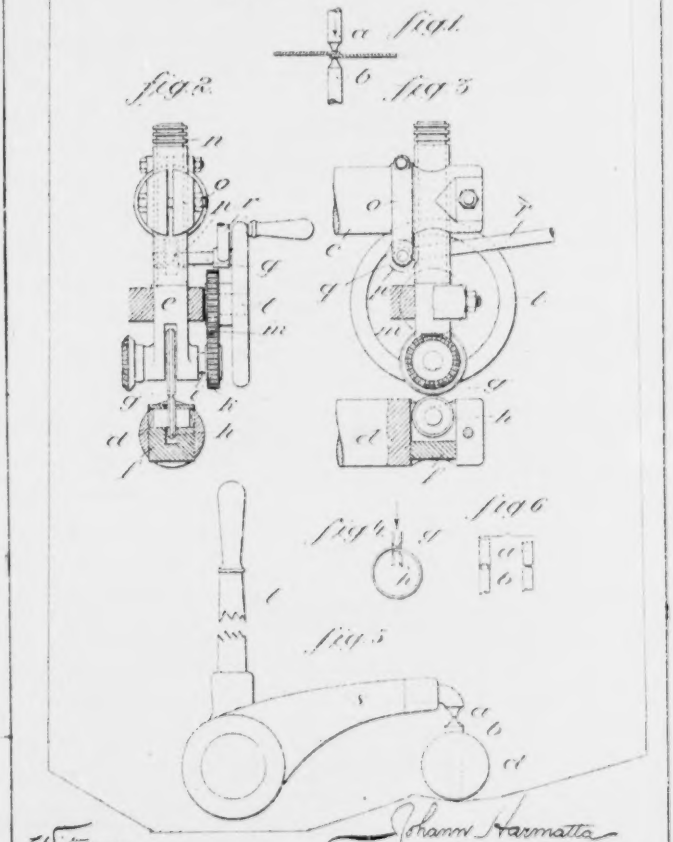
Johann Harmuth, Inventor,
By Marion & Marion
Attorneys

14656

Ex 2677

DIV. 87

Cancelled per Act Dec May 14 1904



Witnesses.
L. Maynard
M. McAleer

Johann Harmatta
Inventor
by Marion & Marion
Attorneys.

1756
50 Copies
Ship Monday 30th

100409

Vol. III.

TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, [redacted] 1923

No. [redacted] 120

THOMSON SPOT WELDER COMPANY, PETITIONER,

vs.

FORD MOTOR COMPANY.

WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT.

PETITION FOR CERTIORARI FILED SEPTEMBER 12, 1922.

CERTIORARI AND RETURN FILED DECEMBER 13, 1922.

(29,139)

(29,139)

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1922.

No. 589.

THOMSON SPOT WELDER COMPANY, PETITIONER,

vs.

FORD MOTOR COMPANY.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT.

VOLUME III.

INDEX.

	Original.	Print.
Exhibit No. 33—Certified copy of file-wrapper and contents of interference No. 36,709, de Ferranti *vs.* Harmatta	465	1467
Exhibit No. 34—Certified copy of file-wrapper and contents of Rietzel U. S. patent No. 928,701	1	1719
Exhibit No. 35—Certified copy of file-wrapper and contents of interference No. 31,792, Rietzel *vs.* Harmatta.	119	1837
Exhibit No. 36—Certified copy of assignment of Harmatta application from Harmatta to Thompson Electric Welding Co	229	1948
Exhibit No. 37—Certified copy of assignment of Rietzel application from Rietzel to Thompson Electric Welding Co. of Maine	233	1952

JUDD & DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., FEBRUARY 23, 1923.

	Original.	Print.
Exhibit No. 38—Certified copy of assignment of Thompson Electric Welding Co. of Maine of all its assets to Thompson Electric Welding Co. of Massachusetts.	237	1956
Exhibit No. 39—Certified copy of assignment of Rietzel patent from Thompson Electric Welding Co. of Maine to Thompson Electric Welding Co. of Massachusetts.	240	1959
Exhibit No. 40—Certified copy of assignment of Harmatta patent and Rietzel patent from Thompson Electric Welding Co. to Thompson Spot Welder Co.	249	1967
Exhibit No. 41—Certified copy of assignment of de Ferranti application from de Ferranti to F. L. Middleton.	253	1971
Exhibit No. 42—Certified copy of assignment of de Ferranti application from F. L. Middleton to Melville Church	256	1974
Exhibit No. 43—Certified copy of assignment of de Ferranti application from Melville Church to H. C. Milligan, trustee	259	1977
Exhibit No. 44—Original license from H. C. Milligan, trustee, to Ford Motor Co. under de Ferranti application	262	1980
Exhibit No. 45—Certified copy of decree on mandate in Thompson Electric Welding Co. *et al.* from Barney & Berry, Inc., under Harmatta patent	264	1982
Exhibit No. 46—Certified copy of record in Thompson Electric Welding Co. *et al. vs.* National Enameling & Stamping Co	267	1985
Summons and service	267	1985
Bill of complaint	268	1986
Appearance	273	1991
Answer	273	1991
Replication	280	1998
Stipulation amending answer	281	1999
Affidavits of Frederick B. Bertrand, Jr.	281	1999
Notice of submission of decree	283	2001
Decree	283	2001
Clerk's certificate	284	2002
Exhibit No. 47—Certified copy of docket entries in Thompson Electric Welding Co. *et al. vs.* U. S. Metal Products Co	285	2003
Exhibit No. 48—Copy of pleadings in Thompson Electric Welding Co. *vs.* U. S. Metal Products Co.	286	2004
Bill of complaint	286	2004
Answer	291	2009
Replication	297	2015
Exhibit No. 49—Dyer photographs A-1 to A-6 (not reproduced)	298	2016
Exhibit No. 50—Dyer photographs B-1 to B-14 (not reproduced)	299	2017
Exhibit No. 51—Dyer photographs C-1 to C-8 (not reduced)	300	2018

	Original.	Print.
Defendant's Exhibit—Agreement of August 3, 1912, between Thompson Electric Welding Co. and American Electric Welding Company	301	2019
Defendant's Exhibit—Agreement of June 10, 1914, between Thompson Electric Welding Company and American Electric Welding Company	308	2026
Defendant's Exhibit—Tilghman correspondence	313	2031
Defendant's Exhibit—Rietzel sketch	323	2041
Exhibit No. 52—Certified copy of Harmatta Canadian application No. 108,990	325	2042
Exhibit No. 53—U. S. patent to Rietzel, 1,041,351	357	2070
Exhibit No. 72—McBerty letter to Mr. McGill, dated April 20, 1914	360	2073
Exhibit No. 73—McBerty letter to Mr. McGill, dated February 1, 1913	364	2077
Defendant's Exhibit—Decision of board of examiners-in-chief in interference No. 36,709, de Ferranti *vs.* Harmatta	366	2078
Exhibit C, C, C, C—Patentblatt of June 22, 1904	369	2081
Exhibit E, E, E, E—Translation of Patentblatt of June 22, 1904	377	2085
Exhibit B, B, B, B—Patentblatt of March 14, 1906	381	2087
Exhibit D, D, D, D—Translation of Patentblatt of March 14, 1906	389	2091
Exhibit F, F, F, F—U. S. patent to Stanley, No. 1,176,614	394	2094
Proceedings in U. S. circuit court of appeals	398	2097
Appearance for appellant	398	2097
Order approving stipulation that 20 copies of record be filed	398	2097
Order assigning cause for hearing	399	2097
Argument and submission	399	2097
Decree	399	2097
Opinion, Knappen, J	401	2098
Clerk's certificate	409	2104
Writ of certiorari and return	410	2104

Defendant's Exhibit No. 33.

2—390.

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the File Wrapper and Contents, in the matter of

INTERFERENCE NUMBER 36,709,

DE FERRANTI

vs.

HARMATTA.

SUBJECT-MATTER: ELECTRIC WELDING.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 14th day of September, in the year of our Lord one thousand nine hundred and seventeen and of the Independence of the United States of America the one hundred and forty-second.

(Seal)

R. F. WHITEHEAD,
Acting Commissioner of Patents.

Vol. 38 1913 67

Page 308. 92

INTERFERENCE No. 36,709.

SEBASTIAN ZIANI DE FERRANTI
S. 668,464, Div. of 208,034

vs.

JOHANN HARMATTA.
Pat. 1,046,066.

ELECTRIC WELDING.

Division 3.

Defendant's Exhibit No. 33.

Room No. 175. 2—251.

Address only
"The Commissioner of Patents,
Washington, D. C."
RAJ

Letter No.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Oct. 2, 1913.

Examiner of Interferences:

An interference is found to exist between the following cases, and in respect to the invention therein specified, to wit:

CASES.

1. Name, Sebastian Ziani de Ferranti; Post-office address, Grindleford Bridge, Sheffield, England; Title, Electric Welding; Filed Dec. 29, 1911, Ser. No. 668,464 (Division of application No. 208,034, May 14, 1904); Attorney, Spear, Middleton, Donaldson and Spear, Washington, D. C.
2. Name, Johann Harmatta; Post-office address, Szepesvaralja, Austria-Hungary; Title, Electric Welding; Filed Dec. 3, 1903, Ser. No. 183,677; Patented Dec. 3, 1912, No. 1,046,066; Attorney, O. E. Duffy and Sons, of 612 F St., N. W., Washington, D. C.; Assignee, Thomson Electric Welding Company, Lynn, Massachusetts.

Intf. Number 36,709.
Intf. declared Oct. 7, 1913.
Statements due Dec. 1, 1913.

INVENTION.

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current

through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

The relation of the counts of the interference to the claims of the respective parties is as follows:

Counts	*De Ferranti*	*Harmatta*
1	6	1
2	7	2
3	8	3
4	9	4

Counts compared.

N.R.

WM. J. RICH,
Examiner, Division 3.

Form 3970.

Administration of United States of America.
Administration des États-Unis d'Amérique.

C 78

WASHINGTON OCT

RETURN RECEIPT
AVIS DE RÉCEPTION

NEW YORK-REEXPORT 1913 OCT 9

for a letter with declared value of .....
d'une lettre avec valeur déclarée de .....
for a registered article (.....) (1)
d'un objet recommandé (.....) (1)
entered at the office
enregistré au bureau 2

of ..... the ....., 19 , under No. 57507 (2)
du ..... le ....., 19 , sous le No. ..... (2)

mailed by M. Szepesváralja
expédiée par M
and addressed to M. Johann Harmatta
et adressé à M , à
(complete address) Szepesváralja
(adresse complète) Austria Hungary

The undersigned declares { that a letter with declared valne / that a registered article } to the above-mentioned address, and
Le soussigné déclare { qu'une lettre avec valeur déclarée / qu'un objet recommandé } à l'adresse susmentionnée, et

Stamp of delivering office.
Timbre du bureau distributeur.

SZEPESVÁRALJA 1913 OKT 23

originating at .....
provenant de .....
delivered the SZEPESVÁRALJA 1913 X 22. , 19
livré le , 19

Signature (3) of the addressee:
Signature (3) du destinataire: HARMATTA JÁNOS
FOS FŐRENDŰ GYÁRA

Signature (3) of the postal official of the office of delivery:
Signature (3) de l'agent du bureau distributeur:
Richmayer pm

(1) Nature of the article (letter, sample, print, etc.).
(1) Nature de l'objet (lettre, échantillon, imprimé, etc.).
(2) Office of origin: date of mailing at that office; registration No. of that office.
(2) Bureau d'origine: date de dépôt à ce bureau; No. d'enregistrement au même bureau.
(3) NOTE.—This receipt must be signed by the addressee or, if the regulations of the country of destination permit it, by the postal official of the office of delivery, then placed in an envelope and sent by the first mail to the office of origin of the article to which it relates.
(3) NOTA.—Cet avis doit être signé par le destinataire ou, si les règlements du pays de destination le comportent, par l'agent du bureau distributeur, puis mis sous enveloppe et envoyé par le premier courrier, au bureau d'origine de l'objet qu'il concerne.

5—4172

36709—3

Statement of Harmatta.
Filed Nov. 26, 1913.
Approved Dec. 5, 1913.
B

UNITED STATES PATENT OFFICE.

IN RE INTERFERENCE No. 36,709.

JOHANN HARMATTA

vs.

SEBASTIAN ZIANI DE FERRANTI.

PRELIMINARY STATEMENT OF JOHANN HARMATTA.

JOHANN HARMATTA, a subject of the King of Hungary, residing at Szepesvaralja, in the Kingdom of Hungary, being duly affirmed, deposes and says that he is a party to the interference declared by the Commissioner of Patents on the 7th day of October 1913, between his patent No. 1,046,066, dated December 3d 1912, and an application for a similar invention filed by Sebastian Ziani de Ferranti; that he conceived the invention set forth in the declaration of interference at the end of the year 1900, without having had then the opportunity of carrying out said invention for lack of time; that on or about the 15th day of September 1901, as he set working his own manufactory at Szepesvaralja, he first made drawings of the device for carrying out the process set forth in the claims involved in the interference; that in the first days of October 1901 he modified an old chain-welding machine so as to be able to carry out said process as set forth in the claims involved in the interference; that on the 15th of to the 20th day of October 1901, he had thin iron sheets welded and attachments welded upon sheet metal vessels successfully and on a manufacturing scale by his workmen, Michael Hozza and Michael Tomaskiewicz, with the help of the process forming the object of the claims involved in the interference; said two workmen, which live here at Szepesvaralja and which remember very well to have performed the said work at the mentioned time, being ready to give testimony in respect of the above facts; that in the course of November 1901 he mentioned said electric weldings of thin iron sheets to Mr. Hegenscheidt, Director General of the firm "Oberschlesische Eisenindustrie A. G." (Upper Silesian Iron Industry Company of share-holders) at Gleiwitz, Silesia, Germany, in the presence of the Chief Engineer of said Mr. Hegenscheidt, Mr. Wilhelm Fischer, which is at present Director, and that said gentlemen promised to inform the firm

"Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz, Silesia, Germany, about the said electric weldings of thin iron sheets; that the firm "Eisenhütte Silesia" received said information from said gentlemen, but raised doubts about the possibility of electrically welding such thin iron sheets without danger of burning through said metal sheets; that said firm "Eisenhütte Silesia," for the sake of verification, sent during the summer of the year 1902, to him (Harmatta) several blanks of sheet metal utensils, which he (Harmatta) welded, with the help of the process forming the object of the claims involved in the interference, to the thorough satisfaction of said "Eisenhütte Silesia"; that then Mr. Schweisfurth of Paruschowitz, technical Director of the firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz, Silesia, Germany came to him in order to look at the electric weldings and the modified chain-welding machine; and, as said Mr. Schweisfurth had convinced himself by ocular proof that it is very easy to weld such thin iron sheets with the help of the process forming the object of the claims involved in the interference, the said firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz acquired the property of said process by a contract made with him (Harmatta) at the date of February 12th 1902, and that from the month of January 1903 a great number of full-size machines adapted to carry out the welding process forming the object of the claims involved in the interference have been manufactured by said "Eisenhütte Silesia" for personal use and sale to others; the first new and full-size machine of this kind having been completed in the last days of January 1903 and first successfully operated and used in February 1903 for carrying out his process, in the works of the "Eisenhütte Silesia," in the village of Paruschowitz, Silesia (Germany).

That patents for such invention were applied for and obtained as follows:

Application filed in Germany, March 24th 1903, published June 20th 1904, patent not granted;

Application filed in Sweden, October 12th 1903, patent dated October 12th 1903, No. 24,035; published the 16th day of November 1907 and granted the 23rd day of January 1908;

Application filed in France, October 13th 1903, patent dated October 13th 1903, No. 336,187; published the 1st day of March 1904 and granted the 7th day of January 1904;

Application filed in Austria, October 14th 1903, patent dated August 1st 1905, No. 24,335; published the 8th day of January 1905 and granted the 30th day of March 1906;

Application filed in Denmark, October 14th 1903; published May 16th 1905, patent not granted;

Application filed in Luxemburg, October 14th 1903, patent dated October 15th 1903, No. 5300; published the 14th day of October 1903 and granted the 14th day of October 1903;

Application filed in Hungary, October 15th 1903, patent dated

October 15th 1903, No. 31,382; published the 29th day of April 1904 and granted the 24th day of August 1904;

Application filed in Switzerland, October 15th 1903, patent dated October 15th 1903, No. 29,723; published June 21st 1905 and granted the 21st day of June 1905;

Application filed in Belgium, October 16th 1903, patent dated October 16th 1903, No. 173,119; published the 20th day of January 1904 and granted the 31st day of October 1903;

Application filed in Russia, October 20th 1903, patent not granted.

Application filed in Spain, October 20th 1903, patent dated October 10th 1903, No. 32,726; published the 10th day of December 1903 and granted the 10th day of December 1903;

Application filed in Italy, October 22nd 1903, patent dated October 22nd 1903, No. 180/117; published the 16th day of December 1903 and granted the 16th day of December 1903;

Application filed in Great Britain, October 23rd 1903, patent dated October 23rd 1903, No. 22981/1903; published the 20th day of October 1904 and granted the 25th day of August 1904;

Application filed in Canada, December 4th 1903, patent not granted;

Application filed in Japan, December 14th 1903, patent dated April 6th 1905, No. 8640; published the 6th day of April 1905 and granted the 6th day of April 1905;

Application filed in Romania, July 11th 1906, patent not granted.

That such invention was fully described in the following patent specifications:

Sweden No. 24,035;
France No. 336,187;
Austria No. 24,335;
Hungary No. 31,382;
Switzerland No. 29,723;
Great Britain No. 22981/1903;
Japan No. 8640.

The knowledge of such invention was first introduced in the United States on or about December 3rd 1903 by the papers belonging to United States application for patent Serial Number 183,677, filed December 3rd 1903, the said papers being the application upon which the aforesaid patent No. 1,046,066 was granted, said application papers having been sent by deponent to Messrs. Marion & Marion at Montreal, Canada, who filed said application in the United States Patent Office on or about December 3rd 1903.

American Consulate General Budapest Hungary:—ss:

JOHANN HARMATTA,
N. Y. 599/1913.

Subscribed and affirmed before me this 7th day of November 1913.

F. E. MALLETT,
Vice and Deputy Consul General.

(Seal)

(Foreign Fee Stamp)

No. 5

2—207

Address only
The Commissioner of Patents. RRM
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

Nov. 26, 1913.

Before the Examiner of Interferences:

Intf. No. 36709.

In the matter of the interference of Harmatta vs. de Ferranti.

SIR:

You are hereby informed that the preliminary statement of Harmatta has been received and filed.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

O. E. Duffy & Sons,
612 F St. N. W.
6—2051 Washington, D. C.

(Printed Letter Head Omitted)

Washington, D. C., November 25, 1913.

Hon. Commissioner of Patents,
Washington, D. C.

SIR:

We enclose herewith preliminary statement of Sebastian Z. de Ferranti, in the interference of de Ferranti vs. Harmatta, No. 36709. We call attention to the early date of filing of the British patent of de Ferranti, under which a convention date is claimed of May 25, 1903, and as the date of filing of the Harmatta case is later than this it is asked that de Ferranti be regarded as the senior party in the interference in the setting of times for taking testimony.

Respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR.
By ELLIS SPEAR.

REO

Statement of di Ferranti
Filed Nov. 26 1913
Approved Dec. 5 1913

36709—5

UNITED STATES PATENT OFFICE.

INTERFERENCE No. 36709.

In the matter of the interference between

SEBASTIAN ZIANI DE FERRANTI

AND

THE THOMSON ELECTRIC WELDING COMPANY,

Assignees of JOHANN HARMATTA.

PRELIMINARY STATEMENT OF SEBASTIAN ZIANI DE FERRANTI.

Kingdom of Great Britain and Ireland, City of London, England, ss:

SEBASTIAN ZIANI DE FERRANTI, Engineer, of Baslow, in the County of Derby, England (late of Grindleford Bridge, Sheffield, in the County of Derby, England, and of 31, Lyndhurst Road, Hampstead, London, England,) being duly sworn, doth depose and say:

THAT he is a party to the above numbered Interference declared by the Commissioner of Patents, dated October 7th, 1913, between his application Serial No. 668461, filed December 29th, 1911, "ELECTRIC WELDING", which was itself divided off from his Patent Application Serial No. 208034, filed May 14th, 1904, for a "PROCESS AND APPARATUS FOR ELECTRICALLY WELDING TURBINE BLADES TO THEIR CARRYING ELEMENTS", and Patent No. 1,046,066, granted to THE THOMSON ELECTRIC WELDING COMPANY, Lynn, Massachusetts, Assignees of JOHANN HARMATTA, of Szepesvaralja, Austria-Hungary, for "ELECTRIC WELDING", the application in pursuance of which said patent was granted having been filed by him on 3rd December 1903, bearing the Serial No. 183677.

THAT he conceived and made the invention set forth in the Declaration of Interference in or about the month of November 1902 being at that time in England.

THAT patents for such invention were applied for as follows:

Application filed in GREAT BRITAIN, May 25th, 1903, under No. 11921. Published on the 25th August 1904, Patent issued on 9th November, 1904.

Application filed in AUSTRIA on May 20th, 1904, which application was published on the 15th July, 1905, and the Patent was issued on 27th December, 1905, under No. 22567.

Application filed in GERMANY under No. F. 18896, on the 21st May, 1904, and the Patent was issued on the 2nd May, 1907, under No. 184014.

Application filed in BELGIUM under No. 141999 upon the 26th May, 1904, Patent issued on the 15th June, 1904, under No. 177505.

Application filed in HUNGARY under No. 6671 on the 28th May, 1904, Specification published 12th July, 1905, Patent issued 2nd September, 1905, under No. 33799.

Application filed in FRANCE under No. 9543 on the 31st May, 1904, Specification published 25th August 1904, Patent issued 25th August, 1904, under No. 344053.

Application filed in SWITZERLAND under No. 37595 on the 25th February, 1905, and divided from Patent No. 31796, issued on the 20th May, 1904. Specification published 26th September, 1905, Patent issued 31st October, 1905, under No. 33124.

Application filed in RUSSIA under No. 26649, on
27th April, 1905.
10th May, 1905 Allowed on the 13/26th December, 1912. Patent not yet granted.

Application filed in CANADA under No. 118355, on the 23rd May, 1905, Patent issued on the 6th November, 1906, under No. 101886.

Application filed in Italy under No. 79 on the 27th July, 1905,
100
Patent issued upon the 18th September, 1905, under No. 208, Volume 211.

Application filed in the UNITED STATES OF AMERICA under Serial No. 385056, filed 22nd July 1907, divided from application Serial No. 208034, filed 14th May, 1904. Patent issued 24th December, 1907, under No. 874398.

That his invention has never been described in a printed publication by him other than by the issues of copies of the specifications of the various patents so far published as set out hereinabove.

THAT the knowledge of this invention was introduced into the United States by the sending thereto of the papers in connection with the application for patent, which, as he is informed and does verily believe, were dispatched from London, England, on the 2nd May, 1904, by his British Patent Agents, Messrs. Marks & Clark, of 18, Southampton Buildings, in the County of London, England, with a letter to their United States correspondents: Messrs. Spear, Middleton, Donaldson & Spear, of 1003, F. Street, Washington, D. C., now of Victor Building, 9th & Grant Place, Washington, D. C., the Attorneys of Record, instructing the said Messrs. Spear, Middleton, Donaldson & Spear to file such application and solicit-

ing their services in procuring a patent therefor in the United States.

THAT he is informed that this letter with the application papers was received by the said Messrs. Spear, Middleton, Donaldson & Spear, and the application filed in the United States Patent Office on the 14th May, 1904.

THAT under the provisions of the International Convention for the protection of industrial property, to which Great Britain and the United States are parties, he claims the date of conceiving and making his invention, forming the subject matter of the present Interference in England viz., November 1902 or failing this, he claims the date of his application for a patent in Great Britain, namely May 25th, 1903, as the date of the invention forming the subject matter of the present Interference, and forming part of his "Process and apparatus for electrically welding turbine blades to their carrying elements," set out in his United States patent application Serial No. 208034 above referred to, such United States application being embodied and covered by the said British application under Patent No. 11921 of 1903, granted thereon, as is established by the certified copy of the British patent No. 11921 of 1903, now produced and shown to him, and attached hereto and marked "S. Z. de F[1]."

SEBASTIAN ZIANI DE FERRANTI.

Sworn at the Consulate-General of the United States of America at London, England, this 15th day of November 1913 before me Hubert D. Jamison, Deputy Consul-General of the United States of America at London, England.

[SEAL] Foreign Fee Stamp.

WB/LW 6859

matter } Interference
No. 36709.
e Ferranti Exhibit
tified Copy [Second Edition.]
rish patent 1921."

I Certify this, including the Drawing forming part thereof, to be a true Copy.
DOCKET CLERK
NOV 22 1916
13 FEB 1913
U. S. PATENT OFFICE
H. Hayford
Acting for Comptroller.

11116

N° 11,921 A.D. 1903

3 5633 9

1921

Date of Application, 25th May, 1903

Complete Specification Left, 25th Feb., 1904—Accepted, 25th Aug., 1904

E.S.F. A.P.

PROVISIONAL SPECIFICATION.

"Improvements in and relating to the Electric Welding of Turbine Blades."

I, SEBASTIAN ZIANI DE FERRANTI, Engineer, of 31, Lyndhurst Road, Hampstead, London, N.W. do hereby declare the nature of this invention to be as follows:

The invention relates to improvements in and relating to the electrical welding of turbine blades to the discs or drums carrying them, and has for its object to overcome the difficulties which have been experienced in electrically welding together the two parts which differ considerably as regards their power of rising to the required welding temperature when heated at the point of junction.

The main difficulty arises through the blades and their carrying discs differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the disc, ring or the like to which it is to be secured it is found that the comparatively large volume of metal forming the disc rapidly conducts heat away from the welding point, thus preventing the temperature of the disc part rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of metal of the disc in the neighbourhood of the welding point so that approximately equal heating occurs in both faces to be welded, whereby turbine wheels with welded blades may be reliably produced in an inexpensive way.

In carrying out my invention according to one modification grooves may be cut across the edge of the ring or several grooves may run circumferentially completely round the edge, or again intersecting sets of grooves inclined to one another may be cut on the edge of the ring.

According to another modification, radial holes may be bored a short distance into the edge, either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded or arranged without particular reference to the position of the blades.

The object to be kept in mind in [illegible] as explained above, while at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint.

Again, the result aimed at may be secured by boring holes through from face to face of the ring at a radius slightly less than that of its outside edge.

According to another modification of the invention, the ring may be built up of two or more thinner rings held in their relative positions by distance pieces or in any other convenient manner, the blades being then welded in position on their outside edges.

Again, the ring may be built up of a set of thin laminae, the edges of which are notched, the laminae being assembled in such a way that the notches

[*Price* 8*d.*]

are "stepped" with regard to each other, the intervening projections of metal thus following the shape of the turbine blades to be welded to them.

Dated this 25th day of May 1903.

MARKS & CLERK.
18, Southampton Buildings, London, W.C.
15, Temple Street, Birmingham, and
30, Cross Street, Manchester,
Agents.

COMPLETE SPECIFICATION.

"Improvements in and relating to the Electric Welding of Turbine Blades."

I, SEBASTIAN ZIANI DE FERRANTI, Engineer, of 31, Lyndhurst Road, Hampstead, London, N.W., do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The invention relates to improvements in and relating to methods of electrically welding turbine blades to the discs, drums or the like carrying them and has for its object to overcome the difficulties which have been experienced in electrically welding together two such parts differing considerably as regards their power of rising to the required welding temperature when heated at the point of junction, so that blade carrying elements with welded blades may be reliably produced in an inexpensive manner.

The main difficulty arises through the blades and their carriers differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the carrier to which it is to be secured, it is found that the comparatively large volume of metal forming the carrier rapidly conducts heat away from the welding point, thus preventing the temperature of the carrier rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of the blade carrying element in the neighbourhood of the welding point, so that approximately equal heating occurs in both faces to be welded.

Referring to the accompanying drawings which, with the exception of Figure 4, show the invention applied, by way of example, to a type of parallel flow turbine in which the blades are mounted on the edge of a wheel-like body,

Figure 1 is a part side elevation of such a wheel having cross grooves,

Figure 1ª being an edge view:

Figure 2 shows a similar edge view of a modification in which sets of intersecting grooves are adopted;

Figure 3 shows an edge view of a form having circumferential grooves,

Figure 4 shows, in longitudinal sectional elevation, part of a drum carrier to which the blades are welded in accordance with one form of the invention:

Figures 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disc, while

Figure 7 is a part side elevation in which holes are bored through from face to face of the disc:

Figure 8 shows a sectional plan of a form of wheel built up of two dished discs, held apart at their circumferential portions by distance pieces.

THE SEAL OF THE PATENT OFFICE

Figure 8ª being a scrap edge view to a larger scale;

Figure 9 is a similar sectional plan of a modified form of wheel built up of three discs, while

Figure 9ª is a corresponding scrap edge view also to a larger scale:

Figure 10 shows a part sectional elevation of a wheel built up of two comparatively thick discs having notched edges,

Figure 10ª being a scrap edge view, while finally

Figure 11 shows an edge view of a form of wheel built up of a series of "stepped" laminae.

It will be seen that all the edge views are shown as developments for clearness of drawing and not as true projections.

The same reference symbols are, when possible, used in the accompanying drawings to denote similar parts.

In carrying out the invention according to the form shown in Figures 1 and 1ª, the turbine wheel or disc is shown at *a*, cross grooves, *b*, being cut in its circumferential edge so as to leave projecting portions of metal, *c*, to which the turbine blades, *d*, are welded.

The same object is attained by cutting two intersecting sets of grooves, *e*, in the edge of the disc, as is shown in Figure 2, or by cutting circumferential grooves, such as *f*, completely round the edge (see Figures 3 and 3ª.)

Figure 4 shows the invention, according to one form, applied to the case of a drum blade carrier, a^1: the drum is grooved circumferentially with grooves, f^1, the intervening collars of metal being then cross-cut to form projecting teeth, c^1, on which the blades are welded.

According to a modified form, radial holes, *h*, may be bored a short distance into the edge of the disc, these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in Figure 5, or arranged without particular reference to the position of the blades, (see Figure 6).

In Figure 7, a method is shown of removing metal in the neighbourhood of the welding point by boring holes, *i*, through (or partly through) from face to face of the disc at a radius slightly less than that of its outside edge.

The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, whilst at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint.

Referring now to Figures 8 and 8ª, a form of wheel is shown somewhat diagrammatically which is built up of two dished discs, *k*, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces such as *l*, disposed at a radius somewhat less than the maximum radius of the discs, the blades, *d*, being welded in position on their outside edges.

Figures 9 and 9ª show a type of wheel generally similar to that last described but having an intermediate plane disc, *m*, in addition to the two dished discs, *k*: a portion, *n*, of the hub, *o*, is in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, *l*, are indicated as before but any other convenient method of holding the discs in their correct relative position may be adopted.

In Figures 8 and 9, the dished discs, *k*, are indicated as secured to the hub, *o*, by means of the inner edge of the [illegible]

In the modification shown in Figure 10 and 10ª two dished discs, *k*, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, *b*, being cut in their edges in accordance with the method described above with reference to Figures 1 and 1ª.

Again, that portion of the disc carrying the blades, may be built up of a set of thin laminae, *r*, (see Figure 11) the edges of which are notched as at *s*, the laminae being assembled in such a way that the notches, *s*, are "stepped"

with regard to each other, so that the intervening projections of metal may follow the shape of the turbine blades to be welded to them.

Instead of notching the laminae, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

In an invention such as the present, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the scope is sufficiently indicated by the many examples given above, and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described above by way of example.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In turbines, the method of welding the turbine blades to the element carrying them, consisting in so adjusting the volume of metal in the blade carrier in the neighbourhood of the welding point, that approximately equal heating occurs in the two parts, substantially as described.

2. In turbines, blade carrying elements having blades welded thereupon in accordance with the method claimed in Claim 1.

3. In turbines, grooving the blade carrier in the neighbourhood of the welding point, substantially as and for the purpose described.

4. The bladed turbine element, hereinbefore described with reference to Figures 1 and 1ª of the accompanying drawings.

5. The bladed turbine element, hereinbefore described with reference to Figure 2 of the accompanying drawings.

6. The bladed turbine element, hereinbefore described with reference to Figures 3 and 3ª of the accompanying drawings.

7. The bladed turbine element, hereinbefore described with reference to Figure 4 of the accompanying drawings.

8. In turbines, forming holes in the blade carrier in the neighbourhood of the welding point, substantially as and for the purpose described.

9. The bladed turbine elements hereinbefore described with reference to Figures 5 and 6 of the accompanying drawings.

10. The bladed turbine element, hereinbefore described with reference to Figure 7 of the accompanying drawings.

11. In turbines, building the blade carriers of comparatively thin parts across the non-touching edges of which the blades are welded, substantially as described.

12. The bladed turbine element, hereinbefore described with reference to Figures 8 and 8ª of the accompanying drawings.

13. The bladed turbine element, hereinbefore described with reference to Figures 9 and 9ª of the accompanying drawings.

14. The bladed turbine element, hereinbefore described with reference to Figures 10 and 10ª of the accompanying drawings.

15. In turbines, building the blade carriers of prepared laminae assembled in a "stepped" manner, substantially as and for the purpose hereinbefore described.

16. The bladed turbine element [illegible] with reference to [illegible]

Dated this 24th day of February, 1904

MARKS & CLERK.
18, Southampton Buildings, London, W.C.
13, Temple Street, Birmingham, and
30, Cross Street Manchester.
Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson [illegible]
(6, 8719. 30—7. 1904.)

A.D. 1908 May 25 No. 11,921.
DE FERRANTI'S Complete Specification

(1 SHEET)

(3rd Edition)

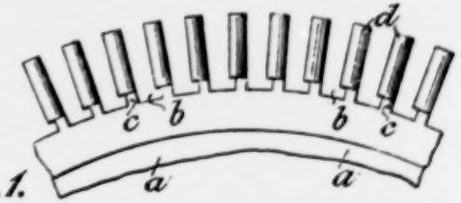


Fig. 1.

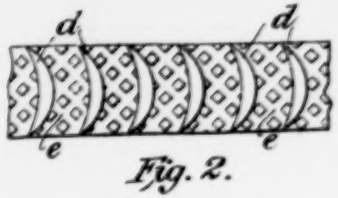


Fig. 2.

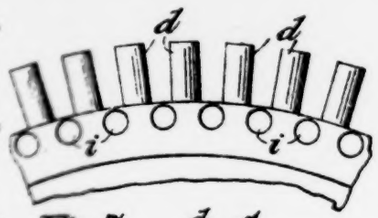


Fig. 7.

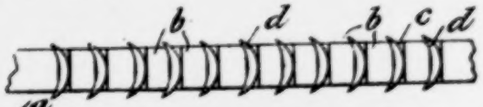


Fig. 1a.



Fig. 3.

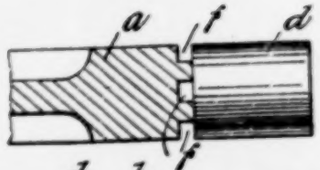


Fig. 3a

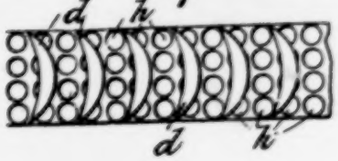


Fig. 6.



Fig. 4.

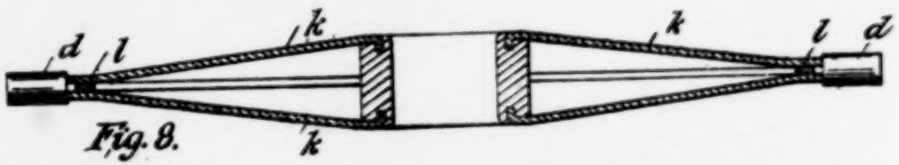


Fig. 8.



Fig. 8a

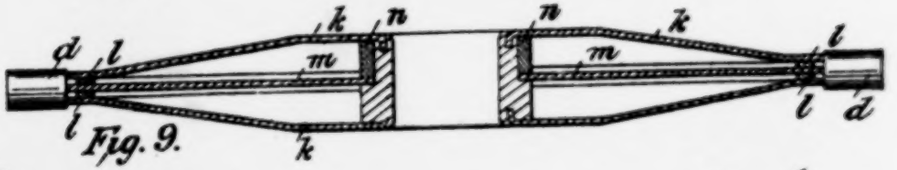


Fig. 9.



Fig. 9a

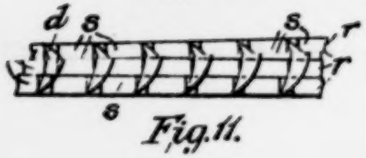


Fig. 11.

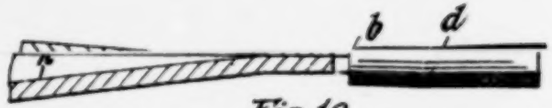


Fig. 10.



Fig. 10a.

[This Drawing is a reproduction of the Original on reduced scale.

Malby & Sons, Photo-Litho.

2—207 #6

Address only
The Commissioner of Patents,
Washington, D. C. RRM

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Nov. 28, 1913.

BEFORE THE EXAMINER OF INTERFERENCES.

In the Matter of the Interference of

HARMETTA

vs.

DE FERRANTI.

INTERFERENCE No. 36709.

Sir:

You are hereby informed that the preliminary statement of de Ferranti has been received and filed.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Washington, D. C.

6—2051

Room 63. 2—215.
All communications should be addressed to
"The Commissioner of Patents,
Washington, D C."

Paper No. 7.

Defendant's Exhibit No. 33.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

Washington, D. C., December 5, 1913.
Mailed " " "
Interference Division.

IN RE INTERFERENCE 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-entitled case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

The parties to the above-entitled interference are hereby notified that their preliminary statements are approved, and that testimony must be taken, forwarded, and printed in accordance with the published Rules of Practice of the office.

The dates of filing and the serial numbers of the applications are given, and the times for taking testimony and for final hearing are set as follows:

No testimony to be taken within thirty days.

Sebastian Ziani de Ferranti, filed Dec. 29, 1911, Ser. No. 668,464; division of application No. 208,034, filed May 14, 1904.

Testimony in chief to close March 5, 1914.

Johann Harmatta, filed December 3, 1903, Ser. No. 183,677; patented De. 3, 1912, No. 1046066.

Testimony to close April 6, 1914.

Rebuttal testimony of de Ferranti to close April 21, 1914.

Final hearing: June 23, 1914, at 11 a. m.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Dec. 11 1913.
U. S. Patent Office.
Mail Room.
Dec. 11 1913.
U. S. Patent Office.

36,709—8

New York, December 8th, 1913.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In the matter of the interference JOHANN HARMATTA vs. SEBASTIAN ZIANI de FERRANTI, No. 36,709:

The undersigned, assignee of record of the United States Patent No. 1,046,066, involved in the above interference, hereby appoints Henry C. Townsend and Charles F. Tischner, Jr., constituting the firm of Townsend & Decker, 149 Broadway, New York, its attorneys, to prosecute said interference and to transact all business in the Patent Office connected therewith.

Signed at Lynn, in the County of Essex and State of Massachusetts, this *9th* day of December 1913.

THOMSON ELECTRIC WELDING CO.
By W. O. DODGE,
Treasurer.

36,709 Letter No. 9

Address only
The Commissioner of Patents
Washington, D. C.

EEG

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON.

December 12, 1913.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Sir:

It is noted that Townsend and Decker, of 149 Broadway, New

York, N. Y., have been appointed attorneys for the party Harmatta in the above entitled interference.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

S. Z. DE FERRANTI,
c/o SPEAR, MIDDLETON, DONALDSON & SPEAR,
Washington, D. C.

Letter No.

Address only
The Commissioner of Patents
Washington, D. C. EEG

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON.

December 12, 1913.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Sirs:

As the assignee of entire interest in the patent of Johann Harmatta, involved in the above entitled interference, has intervened and appointed an attorney of its own selection, further correspondence will be conducted with said attorney.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

O. E. DUFFY & SONS,
612 F St. N. W.
Washington, D. C.

Docket Clerk.
Dec. 31, 1913.
U. S. Patent Office.

Intf. No. 36,709, Paper No. 10.

Mail Room.
Dec. 31, 1913.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In the matter of the Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

Messrs. Spear, Middleton, Donaldson & Spear,
Victor Building,
Washington, D. C.

Sirs:

PLEASE TAKE NOTICE that on Monday, the 5th day of January 1913, at 10 a.m. or as soon thereafter as counsel can be heard, we shall call up the annexed petition before the Commissioner of Patents for his determination.

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, December 30th, 1913.

Mail Room.
Dec. 31, 1913.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In the matter of the Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

To the Hon. Commissioner of Patents:

PETITION.

Your petitioner, Johann Harmatta, by his attorneys, Messrs. Townsend & Decker, respectfully shows that he is a party to the interference declared between his patent No. 1,046,066, dated De-

cember 3rd 1912, and an application filed by Sebastian Ziani de Ferranti on December 29th 1911, Serial No. 668,464, which de Ferranti application is alleged to be a division of his application filed May 14th 1904, Serial No. 208,034; that the divisional application was filed at such a date that the party de Farranti is compelled to rely upon the application of which the application in interference is alleged to be a division and in fact it has been stated by the attorneys for said de Ferranti that it is the intention to rely on said earlier application as a record date; that on December 10th 1913 your petitioner ordered a certified copy of the file wrapper, contents and drawings of the application Serial No. 668,464, as well as a certified copy of the file wrapper, contents and drawings of the application Serial No. 208,034, from which the application 668,464 is alleged to be a division; that your petitioner received a reply from the Patent Office under date of December 12th 1913 as follows:

> "The Docket Clerk reports that you are not entitled to a copy of the divisional application as de Ferranti gains no advantage by reason of such application, he being the junior party to the proceeding."

As it is necessary to rely on the parent application and as the party de Ferranti intends to rely on such application as a record date, your petitioner prays that your Honor instruct the Docket Clerk or other proper officer to furnish your petitioner with a certified copy of the file wrapper, contents and drawings of the de Ferranti application Serial No. 208,034.

Respectfully submitted,

JOHANN HARMATTA,
By TOWNSEND & DECKER,
Attorneys.

New York, December 30th, 1913.

AFFIDAVIT OF SERVICE.

County of New York, State of New York, ss:

Henry A. Gens, being duly sworn, deposes and says that he is a clerk in the office of Messrs. Townsend & Decker, 149 Broadway, New York; that on Tuesday, December 30th 1913, he deposited with the Post-office authorities at New York City, New York, and caused to be sent prepaid, by registered mail, a sealed envelope addressed to Messrs. Spear, Middleton, Donaldson & Spear, Victor Building, Washington, D. C., as per attached registry slip, which envelope contained a copy of the accompanying petition.

HENRY A. GENS.

Subscribed and sworn to before me this 30th day of December 1913.

W. R. WARNER,
Notary Public.

(Seal)

Notary Public No. 4196, New York County, Register's No. 5237.

Commission expires March 30, 1915.

No. 70967. Receipt for registered mail.
New York (Hudson Term Sta.), N. Y.
Dec. 30, 1913.
Registered.

Class postage prepaid. Postmaster, per P.

EEG
Address only
The Commissioner of Patents,
Washington, D. C.

Intf. No. 36,709, Paper No. 11.
Paper No.

2—201.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

January 2, 1914.

PETITION BY HARMATTA.

Sir:

The case of

DE FERRANTI

vs.

HARMATTA,

INTF. No. 36,709,

will be heard by the Commissioner on the 8th day of January, 1914, at *11:30* A. M.

The hearings will commence at ten o'clock, and as soon as the argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;

Motions, thirty minutes, each side;

Interference appeals, final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in inter-

ference cases, and in such case a full and fair opening must be made.

Briefs in interference appeals must be filed in accordance with the provisions of Rule 147.

Respectfully,

THOMAS EWING,
Commissioner of Patents.

To S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.

To Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York City.

6—1961

Docket Clerk.
Jan. 3, 1914.
U. S. Patent Office.

36,709—12

Mail Room.
Jan. 3, 1914.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In the matter of the Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHN HARMATTA.

No. 36,709.

STIPULATION.

It is hereby stipulated and agreed that the time for bringing motions in this case may be extended to and including February 4th 1914, and the Commissioner of Patents is respectfully requested to make an order in accordance herewith.

("S" in margin.)

TOWNSEND & DECKER,
Attorneys for Harmatta.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

New York, December 30th, 1913.

Room No. 261. 2—224
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
HVB

Paper No. 13.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

January 5, 1914.
Mailed January 5, 1914.
Interefence Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6-1652

The stipulation filed January 3, 1914, is approved, and in accordance therewith times are extended as follows:

The time for bringing motions to close February 4, 1914.
de Ferranti's testimony in chief to close April 5, 1914.
Harmatta's testimony to close May 5, 1914.
de Ferranti's rebuttal testimony to close May 20, 1914.
Final hearing: July 20, 1914, at 11 a.m.

H. E. STAUFFER,
Examiner of Interferences.

Defendant's Exhibit No. 33.

Docket Clerk.
Jan. 31, 1914.
U. S. Patent Office.

36,709—14

UNITED STATES PATENT OFFICE.

In the matter of the Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHN HARMATTA.

No. 36,709.

STIPULATION.

It is hereby stipulated and agreed that the time for bringing motions in this case may be extended to and including March 4th 1914, and the Commissioner of Patents is respectfully requested to make an order in accordance herewith.

("Gr." in margin.)

TOWNSEND & DECKER,
Attorneys for Harmatta.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

New York, January 30th, 1914.

Recorded Vol. 112.
Page 253.
January 8, 1914.

Intf. No. 36,709. Paper No. 15.

M.S.D.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

PATENT INTERFERENCE No. 36,709.

PETITION.

ELECTRIC WELDING.

Application of Sebastian Ziani de Ferranti filed Dec. 29, 1911. No. 668,464, division of application filed May 14, 1904.

Patent granted Johann Harmatta Dec. 3, 1912, No. 1,046,066, on application filed Dec. 3, 1903.

Messrs. Spear, Middleton, Donaldson & Spear for de Ferranti.
Messrs. Townsend & Decker for Harmatta.

This is a petition by Harmatta requesting that he be given copies of application No. 208,034 of de Ferranti.

The chief clerk has written Harmatta to the effect that he was not entitled to a copy of this de Ferranti case, although de Ferranti had referred to it in his subsequent application involved in this interference, since, as the chief clerk held, de Ferranti gained no advantage by reason of this prior application.

From the dates set up in the preliminary statement of de Ferranti, it is apparent that in order to win in this interference he must rely on his original application No. 208,034, and to determine whether or not the invention covered by the issue is disclosed in said original application, Harmatta is entitled to see it, and the petition should be and is hereby granted.

J. T. NEWTON,
Assistant Commissioner.

February 2, 1914.

Address only
The Commissioner of Patents.
Washington, D. C.

Intf. No. 36,709.
EEG

Paper No. 16.
Letter No.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

February 2, 1914.

In the matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTF. NO. 36,709.

PETITION.

Sir:

You are hereby informed that the above petition has been granted

by the Assistant Commissioner. Please find enclosed herewith a copy of the decision.

By direction of the Commission:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.
F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.

Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York City.

Room No. 261. 2—224
Address only

"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
LBF

Paper No. 17.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

February 3, 1914.
Mailed February 3, 1914.
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

The stipulation filed January 31, 1914, is approved and in accordance therewith the time within which motions may be brought in this case is extended to March 4, 1914.

In view of the above extension the times for taking testimony and for final hearing are extended as follows:

Testimony in chief of De Ferranti to close May 4, 1914.

Testimony of Harmatta to close June 4, 1914.

Rebuttal testimony of De Ferranti to close June 19, 1914.

Final hearing August 19, 1914, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Feb. 27, 1914. 36,709—18.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In the matter of the Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

STIPULATION.

Owing to the delay in the obtaining of a copy of the de Ferranti original application involved in this matter, it is hereby stipulated and agreed that the time for bringing motions in this case may be extended to and including April 4th 1914 and the Commissioner of Patents is respectfully requested to make an order in accordance herewith.

TOWNSEND & DECKER,
Attorneys for de Ferranti.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for Harmatta.

New York, February 26th, 1914.

Defendant's Exhibit No. 33.

Room No. 261.
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
JHD

2—224

Paper No. 19.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

February 28, 1914.
Mailed February 28, 1914.
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed February 27, 1914, is approved, and in accordance therewith the time within which motions may be brought in this case is extended to April 4th, 1914.

In view of the above extension the times for taking testimony and for final hearing are extended as follows:

Testimony in chief of De Ferranti to close June 4, 1914.
Testimony of Harmatta to close July 6, 1914.
Rebuttal testimony of De Ferranti to close July 21, 1914.
Final hearing September 22, 1914, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Mar. 31, 1914.
U. S. Patent Office.

36,709—20

UNITED STATES PATENT OFFICE.

In the matter of the Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

STIPULATION.

S
Notice

IT IS HEREBY STIPULATED AND AGREED by and between counsel for the respective parties that the time for bringing motions in this case may be extended to and including May 4th, 1914, and the Commissioner of Patents is respectfully requested to make an order in accordance herewith.

TOWNSEND & DECKER,
Attorneys for Harmatta.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

New York, March 30th, 1914.

Room No. 261.

2—224.

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
LBF

Paper No. 21.

Defendant's Exhibit No. 33.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.

April 1, 1914.
Mailed April 1, 1914.
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed March 31, 1914, is approved and in accordance therewith the time within which motions may be brought in this case is extended to May 4, 1914.

In view of the above extension the times for taking testimony and for final hearing are extended as follows:

Testimony in chief of De Ferranti to close July 6, 1914.

Testimony of Harmatta to close Aug. 6, 1914.

Rebuttal testimony of De Ferranti to close Aug. 21, 1914.

Final hearing October 21, 1914, at 11 A. M.

Notice is given, however, that no further extension of the time within which motions may be brought will be granted.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—22
May 4, 1914.
U. S. Patent Office.
Mail Room.
May 4, 1914.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Interference

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

New York, May 2nd, 1914.

Messrs. Spear, Middleton, Donaldson & Spear,
Victor Building,
Washington, D. C.

Sirs:

PLEASE TAKE NOTICE that on Wednesday, the 6th day of May 1914, at 10 o'clock a. m. or as soon thereafter as counsel may be heard before the Examiner of Interferences, we shall move to transmit the accompanying motion for dissolution of this interference to the proper Primary Examiner for his determination and shall also move for a stay of proceedings pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys for Harmatta.

AFFIDAVIT OF SERVICE.

State of New York, County of New York, ss:

Henry A. Gens, being duly sworn, deposes and says that he is a clerk in the office of Messrs. Townsend & Decker, 149 Broadway, New York; that on Saturday, May 2nd 1914, he deposited with the Post-office authorities at New York City, New York, and caused to be sent prepared by registered mail a sealed envelope addressed to Messrs. Spear, Middleton, Donaldson & Spear, Victor Building, Washington, D .C., as per attached registry receipt, which envelope contained a copy of the accompanying motion papers.

HENRY A. GENS.

Subscribed and sworn to before me this 2nd day of May 1914.
(Seal) GEORGE E. BROWN,
Notary Public.

Notary Public—Richmond County. Certificate filed in New York County, No. 147, New York Register No. 5387. Term expires March 30, 1915.

No. 24542 Receipt for Registered Mail.
New York (Hudson Term. Sta.) N. Y.
May 2, 1914.
Registered R S
1 class postage prepaid. Postmaster, per J. L

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

In re Interference

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

MOTION FOR TRANSMISSION.

NOW COMES JOHANN HARMATTA, by his duly authorized attorneys, and moves that the Honorable Examiner of Interferences transmit the accompanying motion for dissolution of this interference to the proper Primary Examiner for his determination. It is also moved that a stay of proceedings be granted pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, N. Y., May 2nd 1914.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE PRIMARY EXAMINER.

In re Interference

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

MOTION TO DISSOLVE.

NOW COMES JOHANN HARMATTA, a party to the above-entitled interference, by his attorneys, and moves that the interference be dissolved on the following grounds:

FIRST:

That the party Ferranti has no right to make the claims forming the subject of the interference for the reason that said claims are a departure from and for a different invention from that which is set forth and disclosed in the original application of which this purports to be a division, since the disclosure made in the original application is exclusively for a process of butt-welding the end of a turbine blade on to its carrier or wheel, whereas the invention claimed in the divisional application by the claims involved in the interference is for a process differing essentially from a mere butt-welding process.

SECOND:

That the party Ferranti has no right to make the claims forming the subject of the interference for the reason that they are based on new matter inserted in the divisional application, for which there is no foundation in the original application, to wit: the paragraph beginning with line 3 page 3, reading as follows:

> "It will thus be seen that on the completion of the welding operation the blades will be attached to the wheel or disk by a plurality of welds isolated from one another."

In the original application there is no foundation for claims for a process of welding surfaces to each other at isolated spots of weld as called for in the counts of the interference.

THIRD:

That the party Ferranti has no right to make the claims forming the subject of the interference by reason of the fact that, as shown by the record of his original application, papers Nos. 27, 28 and 29, he acquiesced in the rejection of claims for the same substantial invention as that for which he now seeks patent and did not make the claims in issue for that invention until more than four years after the publication of the United States Patent No. 928,701, dated July 20th 1909, to A. F. Reitzel, containing said claims, and for many years after the invention had gone into general public and well-known commercial use.

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, N. Y., May 2nd 1914.

506 Defendant's Exhibit No. 33.

Room No. 261. 2—224.

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
LBF

Paper No. 23.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.

May 6, 1914.
Mailed May 6, 1914.
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

This case is before me on motion by Harmatta filed May 4, 1914, to transmit a motion to dissolve.

The motion is set forth in three parts, which will be considered in the order given.

Parts 1 and 2 purport on their face to attack the right of De Ferranti to make the claims of the issue. An inspection of the reasons given, however, makes it apparent that the moving party does not contend that De Ferranti can not make the claims in the application specifically involved, but rather that said application is not a proper division of his earlier case, No. 208,034, of which he has been given the benefit in setting up the interference.

It must be held that the question here presented is not that of the right of De Ferranti to make the claims, but the sufficiency of this party's parent application as a basis for determining his *prima facie* rights. Even should the examiner agree with the moving party and conclude that the parent case does not support the issue, he could not dissolve the interference. The proceeding would con-

tinue as between De Ferranti's alleged divisional application and the patent to Harmatta. The question presented is really one of evidence and should be disposed of by the examiner of interferences in deciding the case upon its merits. The situation is substantially identical with that in the case of Struble vs. Young, 121 O. G., 339; 1906 C. D., 95. In that case the question involved was the sufficiency of an earlier application of Young to support the issue. The examiner of interferences refused to transmit, and his action was sustained by the Commissioner who stated that the question of the sufficiency of the earlier application to support the issue should be used as a basis for the award of priority. In that case reference was also made to the earlier case of Raulet and Nicholson v. Adams, 114 O. G., 1827; 1905 C. D., 55.

The third part of the motion raises the question of estoppel. This likewise is a question to be raised in the final disposition of the case, and not by dissolution. This was so decided in the case of Manly v. Williams, 21 Gourick, 85-11, not published in the Official Gazette.

The motion to transmit is denied.

Limit of appeal: May 16, 1914.

The taking of testimony is suspended.

H. E. STAUFFER.
Examiner of Interferences.

Docket Clerk.
May 16, 1914.
U. S. Patent Office.

Intf. No. 36,709. Paper No. 24.

UNITED STATES PATENT OFFICE.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHN HARMATTA.

No. 36,709.

APPEAL TO THE COMMISSIONER.

The party Harmatta to the above-entitled interference hereby appeals to the Honorable Commissioner of Patents in person from the decision of the Examiner of Interferences rendered May 6th 1914 refusing to transmit to the Primary Examiner the Motion to Dissolve brought by Harmatta.

The following are assigned as the reasons of appeal:

1. It was error to refuse to transmit the first and second grounds of the Motion to Dissolve for the following reasons:

(a) The Examiner erred in holding that even should the Primary Examiner agree with Harmatta in the contention raised by grounds 1 and 2 of the Motion to Dissolve that the Examiner could not dissolve the interference.

(b) The Examiner erred in holding that the interference would continue even if the contentions raised in grounds 1 and 2 of the Motion were sustained.

(c) The Examiner erred in holding that the question presented was one of evidence for the reason that the question raised relates primarily to the right of the party Ferranti to make the claims, based on matters ordinarily passed on by the Primary Examiner and by whom such matters should be reviewed.

(d) The Examiner erred in treating the Motion to Dissolve as being the same as a motion to shift the burden of proof.

2. The Examiner erred in refusing to transmit the third ground of the Motion for the reason that that ground raises questions which should be reviewed by the Primary Examiner before the interference be proceeded with.

JOHANN HARMATTA,
By TOWNSEND & DECKER,
Attorneys.

New York, May 15th, 1914.

EEG 2—201
Address only
The Commissioner of Patents, Paper No. 25.
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON,

May 16, 1914.

APPEAL BY HARMATTA ON MOTION.

ir:

The case of

DE FERRANTI

vs.

HARMATTA,

INTF. No. 36,709,

ll be heard by the Commissioner on the 28th day of May, 1914. The hearings will commence at ten o'clock, and as soon as the

argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;

Motions, thirty minutes, each side;

Interference appeals, final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in interference cases, and in such case a full and fair opening must be made.

Briefs in interference appeals must be filed in accordance with the provisions of Rule 147.

Respectfully,

THOMAS EWING,
Commissioner of Patents.

To Sebastian Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.

To Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York, N. Y.

6—1961

Docket Clerk.
May 28, 1914. Intf. No. 36,709. Paper No. 26.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

INTERFERENCE No. 36,709.

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

BEFORE THE HONORABLE COMMISSIONER OF PATENTS ON APPEAL FROM THE DECISION OF THE EXAMINER OF INTERFERENCES REFUSING TO TRANSMIT HARMATTA'S MOTION TO DISSOLVE.

BRIEF FOR HARMATTA.

This case comes up on appeal by the party Harmatta from the decision of the Examiner of Interferences dated May 6th 1914

refusing to transmit to the Primary Examiner the Motion to Dissolve brought by Harmatta.

The motion to dissolve embodies three grounds:

The first ground denies the right of the party de Ferranti to make the claims forming the subject of the interference for the reason that they are a departure from the disclosure made in the original application filed by de Ferranti and upon which he relies for a record date in this interference.

The second ground denies the right of the party de Ferranti to make the claims forming the subject of the interference for the reason that they are based on new matter inserted in the divisional application, for which there is no foundation in the original application from which the application in interference purports to be a division, the date of the original application being relied upon as a record date for the purpose of the interference.

The third ground alleges that the party de Ferranti has no right to make the claims for the reasons that he acquiesced in the rejection of the claims drawn to the same substantial invention in his original application and is therefore now estopped from asserting his right to these claims.

The interference is between a patentee, Harmatta, and an applicant, de Ferranti. Harmatta filed his application on December 3rd 1903, which matured into a patent on December 3rd 1912. De Ferranti filed the application involved in this interference on December 29th 1911 as an alleged divisional application of his original application filed on May 14th 1904. Both de Ferranti's original and his alleged divisional applications are still pending before the Patent Office.

The first and second grounds of the motion to dissolve, alleging departure from the original disclosure and the incorporating of new matter in the divisional, will first be discussed.

As will appear by the record of de Ferranti's divisional application, it is absolutely necessary for him to rely upon the record date of his original application in order to obtain any right whatever to make the claims forming the subject of the interference, for the reason, as will appear by such record, that there were statutory bars to de Ferranti making these claims in his divisional application if he did not have a disclosure sufficient in his original upon which to base the claims of the interference, to wit:

French patent to Egel No. 336,187, dated March 1, 1904;

British patent to Harmatta No. 22,981 of 1903;

United States patent to Rietzel, No. 928,701, dated July 20, 1909,

it being borne in mind that de Ferranti's divisional application was not filed until December 29th 1911. Incidently, we desire to state that the above Harmatta British patent and the Egel French patent make identically the same disclosure as the Harmatta United States patent involved in this interference.

These statutory bars are part of de Ferranti's official record in

the Patent Office and should be taken judicial notice of by the Examiner of Interferences.

It was necessary that the Primary Examiner should decide that de Ferranti had the right to make the claims in his original application or otherwise he would have been compelled to reject the divisional application on the statutory ground either that the invention was contained in prior patents to Egel, Harmatta and Rietzel, which were publications more than two years prior in date to the filing of the de Ferranti application, or else on the ground that the application was not filed within one year after the date of the filing of the de Ferranti foreign application, which foreign application was matured as a patent (see the British patent No. 11,921 of 1903).

The present motion merely seeks a review of that decision of the Primary Examiner. If, on review, he comes to a different conclusion, the interference would necessarily be dissolved and could not, provided his action in review stands, ever be declared again because of the existence of the statutory bars.

The Examiner of Interferences in his decision refusing to transmit these grounds of the motion to dissolve on the authority of the cases cited by him evidently treated the said grounds as either a motion to shift the burden of proof, or, in effect, that even should the Primary Examiner (it being understood that under the latest modification of the Rules the Law Examiner is substituted for the Primary Examiner) agree with the substance of the first and second grounds or either of them of the motion to dissolve and conclude that de Ferranti had no foundation in his original case for the claims of the interference, that even then he could not dissolve the interference and that the interference would still persist.

Both of the above views are entirely erroneous, in the first place with regard to the shifting of the burden of proof, because there is no such motion before the Examiner of Interferences for the reason that Harmatta is the senior party to the interference at this time, he having filed his application on December 3rd 1903 and de Ferranti did not file even his original application until May 14th 1904, so that, even should it be decided that de Ferranti had such a disclosure in his original case as would warrant the claims of the interference he would still remain the junior party, Harmatta, the moving party and by whom this appeal is taken, being under any circumstances the senior party. In the second place, should the Primary Examiner or the Law Examiner as the case may be, decide that there is no warrant for the claims of the interference in de Ferranti's original case, he would necessarily have to dissolve the interference owing to the statutory bars existing against the making of the claims in the alleged divisional application as appears by the record of said application and as above referred to. In the cases cited by the Examiner of Interferences the interference would still have persisted or would have to be re-declared should the Primary Examiner have decided that the applicant had sufficient

foundation in his original application to make the claims made in the divisional application, the divisional application being involved in the interference. Therefore, the primary reason for refusing to transmit the motion to dissolve in the cited cases was that no matter how the Primary Examiner might decide the motion the interference would persist. This is an entirely different state of facts than is present in the present case, which may be an unusual one but is nevertheless a pertinent one.

AS ABOVE STATED, IN THE PRESENT CASE THE INTERFERENCE WOULD NECESSARILY HAVE TO BE DISSOLVED IF IT IS FOUND THAT DE FERRANTI HAS NO FOUNDATION IN HIS ORIGINAL CASE UPON WHICH TO BASE THE CLAIMS OF THE INTERFERENCE.

To state the case hypothetically, assuming that the Primary Examiner decides that de Ferranti has no right to make the claims forming the subject-matter of the interference for the reason that the disclosure in his original application as filed on May 14th 1904 had no disclosure or foundation for them, the Primary Examiner would have to take judicial notice of the statutory bars in the divisional application as such bars are of record in that application and would necessarily have to dissolve the interference. As the Examiner necessarily has to take judicial notice of these statutory bars for the reason above stated, it was not necessary to specifically raise them in the motion.

Therefore, it was clear error for the Examiner of Interferences to state that the interference proceeding would continue as between de Ferranti's alleged divisional application and the Harmatta patent.

It will be found in every case reported where the motion to dissolve was not transmitted, where such motion related to an original and a divisional application, that the circumstances were such that the granting of the motion to dissolve would not necessarily result in the final determination of the conflict between the applicants or between the applicant and the patentee but that the interference would either have to be renewed or re-declared between the same or other pending applications. As far as can be gathered in each of these decisions, there was no question of the existence of a statutory bar against the making of the claims in the divisional application, of which statutory bar the Examiner would have to take judicial notice.

In conclusion, with regard to the peculiarities of the present case, it must again be reiterated here that should the Primary Examiner agree with the substance of the first and second grounds of the motion, he would necessarily dissolve the interference as part of his duty on account of the statutory bars of which he is well aware and which absolutely prevent the making of the claims in the application specifically mentioned in the interference.

With regard to the third ground raised by the motion to dissolve and relating to the question of acquiescence in the rejection of

claims and estoppel from reasserting such claims, the questions here raised are such as should necessarily be passed upon before putting the parties to the expense of an actual contest.

Under this ground is to be decided the question whether an applicant, after having previously acquiesced in the rejection of claims for the same substantial subject-matter, can again re-assert such claims after delaying for a period of more than four years after he had notice of the United States patent to Rietzel No. 928,701, which contained the identical claims made the subject of the present interference and copied by the party de Ferranti, not from the Rietzel patent, but from the Harmatta patent.

It is respectfully submitted that the Examiner of Interferences was clearly in error in not considering all the peculiar circumstances of this case which differentiate it over those cases heretofore decided and in not transmitting the motion to dissolve, and that his decision should in justice and equity be reversed.

JOHANN HARMATTA,
By TOWNSEND & DECKER,
Attys.

New York, May 26th, 1914.

Hearing:
May 28, 1914.

SET

Recorded Vol. 113.
Page 430.

Intf. No. 36,709. Paper No. 27.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

PATENT INTERFERENCE NO. 36,709.

APPEAL ON MOTION.

ELECTRIC WELDING.

Application of Sebastian Z. de Ferranti filed December 29, 1911, No. 668,464, division of application filed May 14, 1904.
Patent granted Johann Harmatta December 3, 1912, No. 1,046,066, on application filed December 3, 1903.

Messrs. Spear, Middleton, Donaldson & Spear for de Ferranti.
Messrs. Townsend & Decker for Harmatta.

This is an appeal by Harmatta from the decision of the examiner of interferences refusing to transmit a motion to dissolve.

The first two grounds of the motion allege that de Ferranti has no right to make the claims, since his application directly involved herein is not a division, as claimed, of a prior application. The third ground alleges that for specific reasons de Ferranti is now estopped to make the claims. The transmission of the motion as to the last ground is not urged on this appeal.

The examiner of interferences refused to transmit the motion on the ground that the question was one of evidence, since so far as alleged, even if the later application of de Ferranti was not a division of the former, the interference would still exist.

The motion makes no reference to any bar to the grant of a patent to de Ferranti, but it is urged that the record shows the existence of such a bar unless the invention is disclosed in his earlier application, and that therefore if the examiner should agree with the substance of the first and second grounds of the motion, the interference must necessarily be dissolved.

If the moving party desired to urge at the hearing on the motion that certain patents constitute a bar to the grant of the patent to de Ferranti, it should have been so stated in the motion, and the examiner of interferences properly refused to transmit the motion as presented.

The question whether the invention is disclosed in de Ferranti's earlier application will necessarily be raised in connection with the question of priority, and as both parties are relying upon foreign applications and de Ferranti does not allege a date of introduction of the invention into this country prior to Harmatta's filing date, a decision that the invention is not disclosed in the earlier application would, so far as appears, result in an award of priority to Harmatta. Furthermore, there is apparently an inconsistency between the first two grounds of the motion and the third, since the question whether one application is a division of another is not dependent upon the time when claims were presented in the earlier application, but upon the disclosure of the two cases.

Under all the circumstances I do not feel justified in remanding the interference to the law examiner for consideration of the question of dissolution.

The decision of the examiner of interferences is affirmed.

R. F. WHITEHEAD,
Assistant Commissioner.

June 5, 1914.

Address only
The Commissioner of Patents,
Washington, D. C.

Letter No. 28

EEG

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

June 5, 1914.

In the matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTF. No. 36,709.

APPEAL ON MOTION.

Sir:

You are hereby informed that the decision of the Examiner of Interferences has been affirmed by the Assistant Commissioner. Please find enclosed herewith a copy of the decision.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.
F.

Sebastian Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.

Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York City.

Room No. 261. 2—224
Address only
"The Commissioner of Patents, Paper No. 29.
Washington, D. C.,"
and not any official by name.
IAW

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 9, 1914.
Mailed June 9, 1914.
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The Assistant Commissioner having affirmed the decision of the examiner of interferences denying transmission of Harmatta's motion to dissolve, proceedings are resumed and the times for taking testimony and for final hearing are reset as follows:

Testimony in chief of De Ferranti to close August 10, 1914.
Testimony of Harmatta to close September 10, 1914.
Rebuttal testimony of De Ferranti to close Sept. 25, 1914.
Final hearing: November 25, 1914, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
June 10, 1914.
U. S. Patent Office.

36,709—30.

Mail Room.
June 10, 1914.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

New York, June 8th, 1914.

Messrs. Spear, Middleton, Donaldson & Spear,
Victor Building,
Washington, D. C.

Sirs:

PLEASE TAKE NOTICE that on Tuesday, the 16th day of June 1914, at 10 o'clock a.m. or as soon thereafter as counsel may be heard before the Examiner of Interferences, we shall move to transmit the accompanying amended motion for dissolution of this interference to the Law Examiner for his determination and shall also move for a stay of proceedings pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys for Harmatta.

AFFIDAVIT OF SERVICE.

State of New York, County of New York, ss:

Henry A. Gens, being duly sworn, deposes and says that he is a clerk in the office of Messrs. Townsend & Decker, 149 Broadway, New York; that on Tuesday, June 9th 1914, he deposited with the Post-office authorities at New York City, New York, and caused to be sent prepaid by registered mail a sealed envelope addressed to Messrs. Spear, Middleton, Donaldson & Spear, Victor Building, Washington, D. C., as per attached registry receipt, which envelope contained a copy of the accompanying motion papers.

HENRY A. GENS.

Sworn to and subscribed before me this 9th day of June 1914.

W. R. WARNER,
Notary Public.

(Seal.)

Notary Public, Bronx County.
Certificate filed in New York County, No. 114.
New York register No. 5257.
Term expires March 30, 1915.

No. 39527. Receipt for registered mail.

New York (Hudson Term Sta.) L.I.
Registered
Jun 9 1914

1 class postage prepaid. Postmaster, per

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

MOTION FOR TRANSMISSION.

NOW COMES JOHANN HARMATTA, by his duly authorized attorneys, and moves that the Honorable Examiner of Interferences transmit the accompanying amended motion for dissolution of this interference to the Law Examiner for his determination and refer to the annexed affidavit of Charles F. Tischner Jr. in support thereof. It is also moved that a stay of proceedings be granted pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, N. Y., June 8th, 1914.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

AMENDMENT.

NOW COMES JOHANN HARMATTA, by his attorneys, and amends his motion to dissolve filed May 4th, 1914, in the following respects:

Change "Primary Examiner" to "Law Examiner" in the caption.

Erase the period at the end of the first and second grounds of the motion and add the following to each ground: "and statutory bars appearing of record in the case exist against such claims when made in the present application standing by itself, to wit: British Patent to Harmatta No. 22,981 of 1903; U. S. Patent to Rietzel No. 928,701, dated July 20, 1909; and French Patent to Egel No. 335,889, dated Feb. 18, 1904."

Erase the third ground of the motion to dissolve, so that said motion to dissolve as amended will read as follows:

"IN THE UNITED STATES PATENT OFFICE.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

BEFORE THE LAW EXAMINER.

MOTION TO DISSOLVE.

NOW COMES JOHANN HARMATTA, a party to the above-entitled interference, by his attorneys, and moves that the interference be dissolved on the following grounds:

FIRST:

That the party Ferranti has no right to make the claims forming the subject of the interference for the reason that said claims are a departure from and for a different invention from that which is set forth and disclosed in the original application of which this purports to be a division, since the disclosure made in the original application is exclusively for the process of butt-welding the end of a turbine blade on to its carrier or wheel, whereas the invention claimed in the divisional application by the claims involved in the interference is for a process differing essentially from a mere butt-welding process and statutory bars appearing of record in the case exist against such claims when made in the present application standing by itself, to wit: British patent to Harmatta No. 22,981 of 1903; U. S. Patent to Reitzel No. 928,701, dated July 20, 1909; and French Patent to Egel No. 335,889, dated Feb. 18, 1904.

SECOND:

That the party Ferranti has no right to make the claims forming the subject of the interference for the reason that they are based on new matter inserted in the divisional application, for which there

is no foundation in the original application, to wit: the paragraph beginning with line 3 page 3, reading as follows:

> 'It will thus be seen that on the completion of the welding operation the blades will be attached to the wheel or disk by a plurality of welds isolated from one another.'

In the original application there is no foundation for claims for a process of welding surfaces to each other at isolated spots of weld as called for in the counts of the interference and statutory bars appearing of record in the case exist against such claims when made in the present application standing by itself, to wit: British Patent to Harmatta No. 22,981 of 1903; U. S. Patent to Rietzel No 928,701, dated July 20, 1909; and French Patent to Egel No. 335,889, dated Feb. 18, 1904.

TOWNSEND & DECKER,
Attorneys for Harmatta."

TOWNSEND & DECKER,
Attys.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

AFFIDAVIT.

County of New York, State of New York, ss:

Charles F. Tischner, Jr., being duly sworn, deposes and says that he is a member of the firm of Townsend & Decker, 149 Broadway, New York, and has direct charge of this interference; that said firm is the attorney of record for the party Harmatta in the above-entitled interference; that as now appears it was inadvertence not to incorporate in the original motion to dissolve a reference to the statutory bars existing against the making of the interfering claims in the alleged divisional application of Ferranti; that said inadvertence did not appear until the Examiner of Interferences refused to transmit the motion to dissolve on the ground that even if the allegations made in the motion were correct the interference could not be dissolved and such holding upheld by the Commissioner on appeal by decision dated June 5th 1914; that the inadvertence came

about by deponent's belief that it was not necessary to specifically call the Examiner's attention in said motion to the statutory bars which would automatically and necessarily apply if the main ground of the motion were upheld and which are of record in Ferranti's alleged divisional application and that any such holding that it was necessary to refer to them in the motion, as held by the Commissioner, came as a complete surprise; that it was deponent's firm belief that the Examiner would be compelled to take judicial notice of the statutory bars appearing in the record of said Ferranti alleged divisional application and further deponent saith not.

C. F. TISCHNER, JR.

Subscribed and sworn to before me this 9th day of June 1914.

W. R. WARNER,

(Seal) *Notary Public.*

Notary Public—Bronx County. Certificate filed in New York County No. 114, New York Register No. 5257. Term expires March 30, 1915.

2—224

Room No. 261
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name
LBF

Paper No. 31.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 18, 1914.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

This case is before me on a motion by Harmatta to transmit an amended motion to dissolve.

De Ferranti is involved in the interference on an application filed December 29, 1911, which is stated in the declaration to be a division of an earlier application No. 208,034, filed May 14, 1904.

In the original motion it was alleged in substance that De Ferranti is not entitled to make the claims because the invention is not disclosed in his early application, no reference being made to the divisional application. This motion was refused transmission on the ground that the right of De Ferranti to make the claims in his application directly involved was not attacked, and hence the interference would not be dissolved even if the early application were held not to support the issue. The refusal to transmit was affirmed by the Commissioner.

The amended motion also attacks the right of De Ferranti to make the claims on the ground that the invention is not present in his early application, and in addition alleges that a statutory bar in the form of several patents exists against the second application. As now framed it is believed the motion should be transmitted. If the early application of De Ferranti does not support the issue, he must then rely upon his second application, and if this application is anticipated by the patents referred to in the motion, dissolution of the interference will result. These are questions which it is believed should be considered by the Law Examiner.

At the hearing some objection to transmission of the motion was made in behalf of De Ferranti on the ground of delay in presenting the second motion. While some delay has occurred it is noted that the amended motion was filed promptly after the decision of the Commissioner, and under the circumstances of the case it is deemed proper to transmit the same.

The motion is granted, and the interference is transmitted to the Law Examiner.

The taking of testimony is suspended.

H. E. STAUFFER,
Examiner of Interferences.

Address only
The Commissioner of Patents,
Washington, D. C.
F-EEG 36,709, Letter No. 32.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 19, 1914.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Sir:

You are hereby informed that a hearing on the motion filed by Harmatta for dissolution has been fixed before the Law Examiner, Room 273, for Thursday, July 23, 1914, at 10 A. M.

This is in accordance with the change in the rules of practice published May 12, 1914, 202 O. G., page 634.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

Sebastian Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Docket Clerk.
July 16, 1914.
U. S. Patent Office.

36,709—33.

IN THE UNITED STATES PATENT OFFICE,

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

It is hereby stipulated and agreed by and between counsel for the parties to the above entitled case, that the hearing of the motion for the dissolution of the interference now set for hearing on Thursday, July 23, be postponed 30 days: the Honorable Commissioner of Patents consenting thereto.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

E-EEG 36,709. Letter No. 34.

Address only
The Commissioner of Patents,
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

July 21, 1914.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Sir:

You are hereby informed that the hearing before the Law Ex-

amiuer on the motion filed by Harmatta for dissolution, has been continued to Wednesday, September 2, 1914, at 2 P. M.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
J.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Docket Clerk. 36,709—35.
Aug. 26, 1914.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

It is hereby stipulated and agreed by and between counsel for the parties to the above entitled case, that the hearing of the motion for the dissolution of the interference now set for hearing on Wednesday September 2d. be postponed thirty days, the Honorable Commissioner of Patents consenting thereto.

TOWNSEND & DECKER,
Attorneys for Harmatta.
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.

Defendant's Exhibit No. 33.

Address only
The Commissioner of Patents.
Washington, D. C.

36,709. Letter No. 36.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Aug. 27, 1914.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

ELECTRIC WELDING.

No. 36,709.

Sir:

You are hereby informed that the hearing before the Law Examiner for September 2, 1914, has been postponed to Friday, October 2, 1914 at 2 p. m.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

S. Z. De Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.

J. Harmatta,
c/o Townsend & Decker,
149 Broadway, New York, N. Y.

Docket Clerk.
Sep. 29, 1914.
U. S. Patent Office.

36,709—37.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

IT IS HEREBY STIPULATED AND AGREED by and between counsel for the respective parties that the hearing of the Mo-

tion to Dissolve this Interference now set for hearing on Friday, October 2nd, 1914, be postponed until November 16th 1914, or as soon thereafter as counsel can be heard, the Honorable Commissioner of Patents consenting.

TOWNSEND & DECKER,
Attorneys for Harmatta.
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.

On request of counsel for Harmatta.
New York, September 28th. 1914.

Address only 36,709. Letter No. 38.
The Commissioner of Patents,
Washington, D. C. EEG

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

September 30, 1914.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Sir:

You are hereby informed that the hearing before the Law Examiner on the motion for dissolution filed by Harmatta, has been continued to Monday, November 16, 1914, at 10 A. M.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
141 Broadway, New York City.

Docket Clerk.
Nov. 12, 1914.
U. S. Patent Office.

36,709—39.

IN THE UNITED STATES PATENT OFFICE:

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

BEFORE THE LAW EXAMINER.

This case comes before your Honor on motion for dissolution brought by Harmatta, alleging that de Ferranti has not right to make the claims.

The motion to dissolve is made on two grounds: first, that the claims forming the issue are a departure from the disclosure made in the original application; and second, that the claims constituting the issue are based on new matter inserted in the divisional application for which there is no foundation in the original application.

With regard to the first ground, the applicant would state that the claims in the divisional application are in no case a departure from and for a different invention from that which is set forth in the original application from which the present application in Interference is a divisional. They are simply generic claims which include matter which applicant originally claimed specifically.

Although the disclosure in the original application was for a process of welding the end face of a turbine blade onto the face of its carrier, yet there was nevertheless present the broad invention of welding together at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

It is a well-recognized point in United States patent practice that the only limitation to the claims in an applicant's patent is the state of the art to which the application relates. This is well settled by the case of Hill vs. Hodge, 12 App. D. C., 528, wherein the court said:

> "An inventor making any generic invention necessarily produces some species of it, and the fact that he has never thought of other specific forms can not deprive him of his right to a broad claim. The inventor may not regard his invention at the time it is produced as any broader than his specific form;

but the question for consideration is not as to his opinion, but is one of fact."

See also the case of Ryder vs. Townsend, 188 F., page 807:

"And when an inventor makes an invention and in his specification points out a specific construction, he may claim the specific costruction and also have a general broad claim, and when this is in order to sustain the broader claim it is not necessary for the patentee to point out in his patent that the specific construction shown is not essential to the invention. The law gives him ample protection whether he does or not."

Although the present application discloses a process for welding turbine blades onto their carrying elements, yet the applicant submits that it is unnecessary that the claims be limited to the specific embodiment which he has shown in his specification.

In the present divisional application the claims are not limited to a process for electrically welding turbine blades to their carrying elements, but are independent of such application as the state of the art cited against this case enabled the applicant to make such claims.

It might also be stated at this juncture, that the same point was raised by the Primary Examiner during the prosecution of the divisional application, and in view of the arguments set forth he withdrew from this attitude, allowed the claims to be inserted, and declared the interference.

With regard to the alleged statutory bars appearing of record to wit: British Patent to Harmatta No. 22981 of 1903, U. S. Patent to Rietzel, No. 928701, dated July 20th, 1909, and French Patent to Egle, No. 335889, dated February 18, 1904. All of these patents are dated subsequent to the date which the applicant claims under the International Convention, viz., May 25, 1903, and in view of the fact that the applicant maintains that the present application is properly entitled to the date claimed under the International Convention, such patents are no bar in the event of the applicant's contention being upheld.

Coming now to the second ground of the motion that de Ferranti had no right to make the claims forming the subject of the Interference for the reason that they are based on new matter inserted in the divisional application, for which there is no foundation, viz., the following paragraph:

"It will thus be seen that on the completion of the welding operation the blades will be attached to the wheel or disc by a plurality of isolated welds."

while this paragraph certainly does not appear in the parent application, it is not a statement of the method, but a mere statement of what has resulted after the method has been carried out. The lan-

guage quoted "It will thus be seen that on the *completion* of *welding operation*" shows clearly that this is what follows as a matter of course from the method previously described, and the whole disclosure therein is sufficient justification for its insertion in the divisional.

The allegation of Harmatta that there is no foundation in the original application for claims for a process of welding surfaces to each other at isolated spots of weld, as called for in the counts of the Interference is at variance with the facts, as the figure in the divisional application is exactly as it stood in the original application.

Further, the following parts of the parent application as originally filed are referred to as furnishing ample foundation for and fully justifying the claims forming the issue:

On page 2, line 11, the following statement appears:

"Figure 1 is a part side elevation of a turbine wheel having *cross grooves.*"

Then at line 14:

"Figure 2 shows a similar edge view of a modification in which *sets of intersecting grooves are adopted.*"

On page 3, last three lines from the bottom, and page 4:

"In carrying out the first part of the invention according to the form shown in Figures 1 and 1a, the turbine wheel or disc is shown at *a*, cross grooves *b*, being cut in its circumferential edge *So AS TO LEAVE PROJECTING PORTIONS OF METAL c TO WHICH THE TURBINE BLADES ARE WELDED.* The SAME OBJECT is obtained by cutting two *intersecting sets of grooves c* in the edge of the disc as shown in Figure 2."

Then in the last paragraph on page 4, the following statement occurs:— "The object to be kept in mind in this, as in other modifications, is to leave sufficient metal to enable the temperature to rise to the welding point as explained above, *WHILST AT THE SAME TIME LEAVING SUFFICIENT AREAS UNTOUCHED TO ENSURE THE MECHANICAL STRENGTH IN THE WELDED JOINT.*"

It is respectfully submitted that when the above extracts from the parent application as originally filed, are considered, the contention of Harmatta that there is no foundation for the claims in the original application, is wholly untenable.

The above paragraph which refers to Figures 1 and 1a, clearly shows that the blade is to be welded to the projectinging portions of metal formed by the grooving of the circumferential edge of the blade carrier, while the same object, viz., the welding of the blades to the projecting pieces of metal, is attained when intersecting sets of grooves are cut as shown in Figure 2 of the parent application, which is identical with the drawing in the divisional application.

The disclosure in the parent application, therefore, shows a pro-

cess of electric welding in which a turbine blade is attached to a carrier by means of a plurality of welds isolated from one another, as in no other manner could a turbine blade be attached when the process illustrated in Figure 2 of the parent application is carried into effect. This being the case, the applicant, finding he was the first so far as the prior art cited by the Examiner was concerned, to weld two parts together electrically by a plurality of welds isolated from one another, he considers that he is entitled under the law and decisions to file claims covering this method broadly and independently of the particular purposes to which the method is applied.

Not only is the paragraph objected to by Harmatta completely justified by the extracts from the parent application, but there is ample foundation for the claims in the original application, and de Ferranti is entitled to the broadest claims which the state of the art will permit.

In conclusion, therefore, it is urged that de Ferranti is entitled to make the claims, that their subject matter is not a departure from the disclosure of the original application, that they are not based on new matter, and as de Ferranti is entitled to the convention date of May 25th, 1903, the patents referred to in the motion are too late to constitute a bar.

Very respectfully,

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

Hearing: 36,709—40.
November 16, 1914. M. S. D.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

PATENT INTERFERENCE No. 36,709.

MOTION FOR DISSOLUTION.

ELECTRIC WELDING.

Application of Sebastian Ziani de Ferranti filed Dec. 29, 1911, No. 668,464, division of application filed May 14, 1904.
Patent granted Johann Harmatta Dec. 3, 1912, No. 1,046,066, on application filed Dec. 3, 1903.

Messrs. Spear, Middleton, Donaldson & Spear for de Ferranti.
Messrs. Townsend & Decker for Harmatta.

The party Harmatta moves to dissolve the interference on the ground that the party de Ferranti has no right to make the claims forming the subject-matter of the interference. The reasons upon which the motion is based will be specifically considered later.

The party Harmatta is a patentee and the issue is in the terms of his claims 1, 2, 3 and 4, which are as follows:

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

The invention upon which the interference is based is a process of electric welding which consists broadly in bringing the pieces of metal to be welded into contact and subjecting them locally to pressure and heating current so as to secure the pieces of metal together by what is known as "spot welding."

The Harmatta case shows pieces of relatively thin metal having their edges overlapped and secured together in the manner just stated. Harmatta describes his process as being particularly adapted for securing together sheets of metal used for sheet metal ware like vessels or household utensils. de Ferranti employs the process

disclosed in his case to secure turbine blades to a turbine wheel or support, although he states that his process is of general application. As shown in the de Ferranti drawing, the ends of the blades *d* are brought into contact with spaced projecting portions on the wheel or carrier and electrically welded thereto. The spaced projecting portions are designated *f* in the specification and, as shown in Fig. 2 of the drawing, are formed by intersecting grooves. As also shown in Fig. 2, one end of the blade engages a number of the spaced projections.

The de Ferranti case is set up as a division of an earlier case, Serial No. 208,034, filed May 14, 1904, and if the application involved in interference is not entitled to the filing date of the original application, it is subject to certain statutory bars, i.e., the British patent to Harmatta, No. 22,981 of 1903, the U. S. patent to Rietzel, No. 928,701, July 20, 1909, and the French patent to Egel, No. 335,889, February 18, 1904. That the patents just referred to constitute statutory bars to the grant of a patent to de Ferranti based on the application involved in this interference is admitted, unless the application is a division of the de Ferranti original application.

Broadly stated, Harmatta's motion raises two questions, that of "departure" and "new matter" when a comparison is made of the original and alleged divisional applications of de Ferranti. Thus it is contended in behalf of Harmatta that de Ferranti's original application disclosed only a process of butt welding the end of a turbine blade on to its carrier or wheel, whereas the process claimed in the divisional case differs essentially from a butt welding process. It is further contended in behalf of Harmatta that the following statement found on page 3 of the specification of the divisional case constitutes "new matter" so far as the disclosure of the original case is concerned:

> "It will thus be seen that on completion of the welding operation the blades will be attached to the wheel or disk by a plurality of welds isolated from one another."

The figures of drawing of the de Ferranti application involved in interference correspond to and are substantially identical with Figs. 1 and 2 of the original case. There is in the specification of the original case no definite statement to the effect that the end of the turbine blade is welded to the wheel or support at spots only. However, the practice of the process originally disclosed must result in spot welding broadly, unless the parts to be welded are subjected to heat and pressure for so long a time as to break down the projections on the wheel with which the end of the blade contacts and cause a fusion or coalescence of the entire end surface of the blade and that portion of the wheel with which it engages. In Fig. 1 of the drawing in both original and divisional cases and

also in Fig. 13 of the original case, all of which show the wheel after the blades have been welded thereto, the projections are not broken down but retain substantially, at least, their original heights. If this is a correct showing the conclusion seems inevitable that the blades are welded to the wheel only at spots corresponding to the projections on the wheel, as shown in Fig. 2 of both the original and divisional cases. In the original de Ferranti specification, on page 4, occurs the following statement:

> "The object to be kept in mind in this, as in other modifications, is to leave sufficient metal to enable the temperature to rise to the welding point as explained above, whilst at the same time leaving sufficient areas untouched to ensure the mechanical strength in the welded joint."

Also, on pages 3 and 4, it is stated in describing the grooves in the wheel that the grooves are cut "so as to leave projecting portions of metal *c* to which the turbine blades are welded."

The specification of the original de Ferranti application describes on page 7 and elsewhere the application of pressure to the parts to be welded. It is stated on page 10 of the original specification that as the blade softens under the heat, the pressure of a spring causes a slight shortening of the blade, i.e., the turbine blade, but there is no suggestion that the projections on the wheel or support are broken down or destroyed.

The statement is made in the motion papers that what de Ferranti disclosed in his original case was a process of butt welding and that the claims involved in the interference are for an invention differing essentially from mere butt welding. It may be said with respect to this statement that the claims, in terms at least, do not exclude butt welding but require that the pieces of metal shall be welded together at spots only of their adjacent surfaces. The limitation in the counts to localized pressure is present in de Ferranti, since obviously pressure will be exerted only on those portions of the metal pieces where the projections on the wheel or support contact with the end of the blade.

The only question before the law examiner is that of right on the part of de Ferranti to make claims corresponding to the counts. With respect to this question, it must be answered in the affirmative. The motion for dissolution is accordingly denied. No appeal lies from this decision, hence no limit of appeal is fixed.

E. S. Henry,
Law Examiner.

December 1, 1914.

Address only 36,709—41.
The Commissioner of Patents,
Washington, D. C. EEG Letter No.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

December 1, 1914.

In the matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE NO. 36,709.

MOTION FOR DISSOLUTION.

Sir:

Please find enclosed herewith a copy of a decision of the Law Examiner in the above entitled case.

Very respectfully,

Chief Clerk.
F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Victor Bldg.,
Washington, D. C.

Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York City.

Room No. 261. 2—224.
Address only
"The Commissioner of Patents, Paper No. 42.
Washington, D. C.
and not any official by name.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.

Dec. 3, 1914.
Mailed Dec. 3, 1914.
Interference Division.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

BEFORE THE EXAMINER OF INTERFERENCES.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The law examiner having denied Harmatta's amended motion to dissolve, filed June 10, 1914, proceedings are resumed and the times for taking testimony and for final hearing are reset as follows:

Testimony in chief of De Ferranti to close February 3, 1915.
Testimony of Harmatta to close March 3, 1915.
Rebuttal testimony of De Ferranti to close March 18, 1915.
Final hearing May 18, 1915, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk,
Dec. 12, 1914,
U. S. Patent Office.

36,709—43.

Mail Room,
Dec. 12, 1914,
U. S. Patent Office.

UNITED STATES PATENT OFFICE,

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

BEFORE THE EXAMINER OF INTERFERENCES.

MOTION.

NOW COMES JOHANN HARMATTA, by his attorneys, and moves for a rehearing of his Motion to Dissolve the Interference decided by the Law Examiner December 1st, 1914, upon the grounds:

1. That a question decisive of the case and duly argued by counsel was overlooked, to wit: the principle of the patent law applicable to this case and which, had it been applied, would have necessarily resulted in a different conclusion, that is, the principle that the specification and drawings must be considered together as a whole and with reference to the art to which the invention relates and to the accomplishment of the actual practical purpose of the inventor. In this case the practical purpose of securing the turbine blade to the carrier and the securing thereof in a way consistent with the formation of a joint such as is required in the turbine art would require the actual welding of the whole face of the blade so as to make a steam-tight joint.

The paragraph in the Ferranti specification referred to in the decision of the Law Examiner cannot be taken by itself and apart from the whole purpose of the invention and the art to which it belongs, for to do so would be to interpret the patent inconsistently with the principle of law, as above laid down.

2. There was obvious misapprehension of the electric welding process as evidenced by the statement of the Law Examiner in his

decision that while the turbine blade may shorten under the action of the heat and pressure, the projections on the wheel or support will not be broken down.

3. There was obvious misapprehension of the showing made in Figure 1 of the drawings of the original application in that said Figure in the original application, as pointed out in counsel's argument at the hearing showed and the description described that the projection in this Figure is disposed transversely the entire width of the carrier or wheel.

JOHANN HARMATTA,
By TOWNSEND & DECKER,
Attorneys.

New York, December 11th, 1914.

SET
36,709—44.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

PATENT INTERFERENCE No. 36,709.

MOTION FOR REHEARING.

ELECTRIC WELDING.

Application of Sebastian Ziani de Ferranti filed December 29, 1911, No. 668,464, division of application filed May 14, 1904.
Patent granted Johann Harmatta December 3, 1912, No. 1,046,066, on application filed December 3, 1903.

Messrs. Spear, Middleton, Donaldson & Spear for de Ferranti.
Messrs. Townsend & Decker for Harmatta.

The party Harmatta moves for a rehearing of his motion for dissolution which was denied by the law examiner in a decision dated December 1, 1914.

There appears to be no necessity for making the joint between the base of the turbine blade and its support steam tight, as suggested in the motion for rehearing. It may be that a loss in efficiency would result if the blade were spot welded to its support, but this presents no good reason for assuming that the projecting portions on the wheel are broken down or destroyed. There is in the orig-

inal de Ferranti specification no suggestion that the joint under consideration must be steam tight, but, on the contrary, there are distinct statements that the ends of the blades are welded to the projections, as pointed out in the decision on the motion for dissolution.

The motion for rehearing is denied.

E. S. HENRY,
Law Examiner.

December 15, 1914.

Address only EEG
The Commissioner of Patents, 36,709 Letter No.45.
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

December 15, 1914.

In the matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

MOTION FOR REHEARING.

Sir:

Please find enclosed herewith a copy of a decision of the Law Examiner in the above entitled case.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Victor Bldg.,
Washington, D. C.

Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York City.

Docket Clerk,
Jan. 26, 1915.
U. S. Patent Office.

36,709—46.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

It is hereby stipulated and agreed that the time now set for the taking of de Ferranti's testimony be extended to March 1, 1915, and the other times accordingly.

Very respectfully,

("S" in margin.)

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

2—224

Paper No. 47.

Room 261.
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
IAW

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

January 27, 1915.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

The stipulation filed herein January 26, 1915, is approved and times are extended as follows:

Testimony in chief of De Ferranti to close March 1, 1915.
Testimony of Harmatta to close April 1, 1915.
Rebuttal testimony of De Ferranti to close April 16, 1915.
Final hearing: June 16, 1915, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—48.
Mar. 2, 1915.
U. S. Patent Office.

STIPULATION.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

It is hereby stipulated and agreed by and between the respective parties to the above entitled interference that the times for taking testimony and final hearing be extended fifteen days from the dates now set.

Respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

("S" in margin.)
Feb. 27, 1915.

2—224 Paper No. 49.

Room 261.
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.

IAW

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.

March 3, 1915.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed herein March 2, 1915, is approved and times are extended as follows:

Testimony in chief of De Ferranti to close March 16, 1915.
Testimony of Harmatta to close April 16, 1915.
Rebuttal testimony of De Ferranti to close May 1, 1915.
Final hearing: July 1, 1915, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—50.
Mar. 17, 1915.
U. S. Patent Office.

INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

To the Commissioner of Patents:

It is hereby stipulated and agreed that the times for taking testimony be extended fifteen days from the time now set.

Very respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

("S" in margin.)

2—224 Paper No. 51.

Room No. 261,
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
JHD.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.

March 18, 1915
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed March 17, 1915, is approved and the times herein are extended as follows:

Testimony in chief of De Ferranti to close March 31, 1915.
Testimony of Harmatta to close May 1, 1915.
Rebuttal testimony of De Ferranti to close May 17, 1915.
Final hearing July 20, 1915, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—52
Mar. 25, 1915.
U. S. Patent Office.

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

INTERFERENCE No. 36,709.

The parties are endeavoring to render unnecessary the taking of testimony on the part of de Ferranti by stipulation as to the British patent of de Ferranti, and as it is necessary to secure from London additional information concerning the British application as filed, further time is necessary of the period in which de Ferranti must take his evidence, and in order to allow for the serious delays in the mails it is hereby stipulated and agreed that de Ferranti shall have until May 1st, to conclude his testimony, the other dates being extended accordingly.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.
TOWNSEND & DECKER,
Attorneys for Johann Harmatta.

("S" in margin.)

2—224 Paper No. 53.

Room No. 261,
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
JHD.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

March 26, 1915.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed March 25, 1915, is approved, and the times herein are extended as follows:

Testimony in chief of De Ferranti to close May 1, 1915.
Testimony of Harmatta to close June 1, 1915.
Rebuttal testimony of De Ferranti to close June 16, 1915.
Final hearing August 17, 1915, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—54.
Apr. 27, 1915.
U. S. Patent Office.

S. Z. de Ferranti

vs.

Johann Harmatta.

Interference No. 36,709.

It is hereby stipulated and agreed that the times for taking testimony be extended fifteen days from the dates now set.
("S" and "Notice" in margin.)

Spear, Middleton, Donaldson & Spear,
Attorneys for S. Z. de Ferranti.
Townsend & Decker,
Attorneys for Johann Harmatta.

2—224 Paper No. 55.

Room No. 261,
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
JHD.

April 28, 1915.
Mailed " " "
Interference Division.

Before the Examiner of Interferences.

In re Interference No. 36,709.

Sebastian Ziani de Ferranti

vs.

Harmatta.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
Thomas Ewing,
Commissioner of Patents.

6—1652

The stipulation filed April 27, 1915, is approved, and the times herein are extended as follows:

Testimony in chief of De Ferranti to close May 17, 1915.
Testimony of Harmatta to close June 17, 1915.
Rebuttal testimony of De Ferranti to close July 2, 1915.
Final hearing Sept. 2, 1915, at 11 A. M.

Notice is given, however, that no further extension of De Ferranti's time to take testimony in chief will be granted unless supported by a verified showing setting forth why the testimony could not have been taken within the extension hereinabove allowed.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk
May 17, 1915
U. S. Patent Office

36,709—56

IN THE UNITED STATES PATENT OFFICE.

INTERFERENCE No. 36,709.

SEBASTIAN Z. DE FERRANTI

vs.

JOHANN HARMATTA.

We enclose herewith a stipulation and a certified copy which is filed on behalf of de Ferranti in lieu of testimony, and as constituting Ferranti's testimony in chief.

Respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for Ferranti

May 15, 1915.

Docket Clerk.
May 17, 1915.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

INTERFERENCE No. 36,709.

SEBASTIAN Z. DE FERRANTI
vs.
JOHANN HARMATTA.

It is hereby stipulated by and between the parties to the above entitled interference that the attached certified copy of the provis-

ional specification, complete specification and drawings filed in connection with the proceedings for obtaining British patent No. 11,-921 of 1903, issued to Sebastian Z. de Ferranti, shall be received and accepted in evidence as if introduced in the regular course of taking testimony in the interference.

It is further stipulated and agreed by and between the parties hereto that the Sebastian Z. de Ferranti, who on December 29, 1911, filed the present application, Serial Number 668,464, and who on May 14, 1904 filed the application #208,034 of which the present application purports to be a division, is the same Sebastian Z. de Ferranti who filed the above referred to provisional specification and complete specification and drawings in connection with his application for British patent No. 11,921 of 1903, this stipulation being intended to have the same force and effect in proving the date of filing of his foreign application and the date of filing and subject-matter of the said provisional specification, complete specification drawings and that the application for British patent was filed by the same party who filed the aforesaid United States application as if witnesses had been called and had in fact testified to the matters herein stipulated.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for Sebastian Z. de Ferranti.
TOWNSEND & DECKER,
Attorneys for Johann Harmaita.

May 14th, 1915.

Form P. Cert. 1.

Docket Clerk,
May 17, 1915.
U. S. Patent Office

PATENTS AND DESIGNS ACT, 1907.

IT IS HEREBY CERTIFIED by the Comptroller-General of Patents, Designs and Trade Marks that the annexed are true copies of the provisional specification as lodged on the 25th May, 1903, in connection with de Ferranti's application for Patent No. 11,921 of 1903, filed on the 25th May, 1903, and of the complete specification and drawings as left in connection therewith on the 25th February, 1904.

This certificate is issued for use in Interference Proceedings in the United States of America.

WITNESS my hand this 20th day of April, 1915.

(Seal)

W. TEMPLE FRANKS,
Comptroller-General of Patents, Designs and Trade-Marks.

.....ton Buildings,
.....don, W. C.

Consulate-General of the United States of America, for Great Britain and Ireland, at London.

I, Herbert D. Jameson.....VICE Consul of the United States of America for Great Britain and Ireland at London, do hereby make known and certify to all whom it may concern, that the signature "W. Temple Franks....." subscribed to the annexed Certificate, is of the true and proper handwriting of W. Temple Franks, Comptroller General of Patents, Designs and Trade Marks.....that the seal affixed to the said Certificate is the seal of the Patent Office, England.....and that to all acts signed as the annexed full faith and credit are and ought to be given in Judicature and thereout.

In testimony whereof I have hereunto set my hand and affixed the Seal of the Consulate-General of the United States at London, aforesaid, this 21st day of April, 1915.

HERBERT D. JAMESON,
Vice Consul.

(Seal)

Foreign Fee Stamp.
Consulate General,
21 Apr., 1915.
U. S. A., London.

Docket Clerk,
May 17, 1915.
U. S. Patent Office.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1888.

Form B.

PROVISIONAL SPECIFICATION.

IMPROVEMENTS IN AND RELATING TO ELECTRIC WELDING.

I, Sebastian Ziani de Ferranti, Engineer, of 31, Lyndhurst Road, Hampstead, London, N. W.
do hereby declare the nature of this invention to be as follows:
("11921" and "25 MAY 1903" in margin.)

The invention relates to improvements in methods of electrically welding turbine blades to the discs or drums carrying them, and has for its object to overcome the difficulties which have been experienced in electrically welding together the two parts which differ considerably as regards their power of rising to the required welding temperature when heated at the point of junction.

The main difficulty arises through the blades and their carrying discs differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the disc, ring or the like to

which it is to be secured it is found that the comparatively large volume of metal forming the disc rapidly conducts heat away from the welding point, thus preventing the temperature of the disc part rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of metal of the disc in the neighbourhood of the welding point so that approximately equal heating occurs in both faces to be welded, and turbine wheels with welding blades reliably produced in an inexpensive way.

In carrying out my invention according to one modification grooves may be cut across the edge of the ring or several grooves may run circumferentially completely round the edge, or again intersecting sets of grooves inclined to one another may be cut on the edge of the ring.

According to another modification, radial holes may be bored a short distance into the edge, either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded or arranged without particular reference to the position of the blades.

The object to be kept in mind in this as in other modifications is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint.

Again, the result aimed at may be secured by boring holes through from face to face of the ring at a radius slightly less than that of its outside edge.

According to another modification of the invention, the ring may be built up of two or more thinner rings held in their relative positions by distance pieces or in any other convenient manner, the blades being then welded in position on their outside edges.

Again, the ring may be built up of a set of thin laminae, the edges of which are notched, the laminae being assembled in such a way that the notches are "stepped" with regard to each other, the intervening projections of metal thus following the shape of the turbine blades to be welded to them.

Dated this 25th day of May 1903.

MARKS & CLERK,
18, Southampton Buildings, London, W. C.
13, Temple Street, Birmingham, and
30, Cross Street, Manchester,
Agents.

X^{d}
F J W.
20/4/15.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1888.

Form C. No. 11921.

11921

COMPLETE SPECIFICATION Date 25-5-03.

25 May, 1903.

"IMPROVEMENTS IN AND RELATING TO THE ELECTRIC WELDING OF TURBINE BLADES."

I, Sebastian Ziani de Ferranti, Engineer, of 31 Lyndhurst Road, Hampstead, London, N.W., do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to improvements in and relating to methods of electrically welding turbine blades to the discs, drums or the like carrying them and has for its object to overcome the difficulties which have been experienced in electrically welding together two such parts differing considerably as regards their power of rising to the required welding temperature when heated at the point of junction, so that blade carrying elements with welded blades may be reliably produced in an expensive manner.

The main difficulty arises through the blades and their carriers differing as regards their power of conducting heat away from the welding point.

In the welding of a turbine blade to the carrier to which it is to be secured, it is found that the comparatively large volume of metal forming the carrier rapidly conducts heat away from the welding point, thus preventing the temperature of the carrier rising to the required extent and causing an unsatisfactory weld.

The invention, therefore, consists broadly in adjusting the volume of the blades carrying element in the neighbourhood of the welding point, so that approximately equal heating occurs in both faces to be welded.

Referring to the accompanying drawings which, with the exception of figure 4, show the invention applied, by way of example, to a type of parallel flow turbine in which the blades are mounted on the edge of a wheel-like body.

Figure 1 is a part side elevation of such a wheel having cross grooves.

Figure 1*a* being an edge view;

Figure 2 shows a similar edge view of a modification in which sets of intersecting grooves are adopted;

Figure 3 shows an edge view of a form having circumferential grooves,

Figure 3*a* being a section on the line A A of figure 3;

Figure 4 shows, in longitudinal sectional elevation, part of a

drum carrier to which the blades are welded in accordance with one form of the invention:

Figures 5 and 6 show edge views of modifications in which holes are bored radially into the edge of the disc, while

Figure 7 is a part side elevation in which holes are bored through from face to face of the disc;

Figure 8 shows a sectional plan of a form of wheel built up of two dished discs, held apart at their circumferential portions by distance pieces,

Figure 8*a* being a scrap edge view to a larger scale;

Figure 9 is a similar section plan of a modified form of wheel built up of three discs, while

Figure 9*a* is a corresponding scrap edge view also to a larger scale;

Figure 10 shows a part sectional elevation of a wheel built up of two comparatively thick discs having notched edges,

Figure 10*a* being a scrap edge view, while finally

Figure 11 shows an edge view of a form of wheel built up of a series of "stepped" laminae.

It will be seen that all the edge views are shown as developments for clearness of drawing and not as true projections.

The same reference symbols are, when possible, used in the accompanying drawings to denote similar parts.

In carrying out the invention according to the form shown in figures 1 and 1*a*, the turbine wheel or disc is shown at *a*, cross grooves, *b*, being cut in its circumferential edge so as to leave projecting portions of metal, *c*, to which the turbine blades, *d*, are welded.

The same object is attained by cutting two intersecting sets of grooves, *e*, in the edge of the disc, as is shown in figure 2, or by cutting circumferential grooves, such as *f*, completely round the edge (see figures 3 and 3*a*.)

Figure 4 shows the invention according to one form, applied to the case of a drum blade carrier, *a*1; the drum is grooved circumferentially with grooves, *f'*, the intervening collars of metal being then crosscut to form projecting teeth, *c'* on which the blades are welded.

According to a modified form, radial holes, *h*, may be bored a short distance into the edge of the disc these holes being either arranged in patterns so as to leave intervening projections of untouched metal to which the blades may be welded as shown in figure 5, or arranged without particular reference to the position of the blades, (see figure 6).

In figure 7, a method is shown of removing metal in the neighbourhood of the welding point by boring holes, *i*, through (or partly through) from face to face of the disc at a radius slightly less than that of its outside edge.

The object to be kept in mind in this as in other modifications,

is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, whilst at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint.

Referring now to figures 8 and 8*a*, a form of wheel is shown somewhat diagrammatically which is built up of two dished discs, *k*, of comparatively thin metal, held apart at their circumferential portions by one or more distance pieces such as, *l*, disposed at a radius somewhat less than the maximum radius of the discs; the blades, *d*, being welded in position on their outside edges.

Figures 9 and 9*a* show a type of wheel generally similar to that last described but having an intermediate plane disc, *m*, in addition to the two dished discs, *k*; a portion, *n*, of the hub, *o*, is in this case made detachable so as to allow the different parts of the wheel to be assembled. Distance pieces, *l*, are indicated as before but any other convenient method of holding the discs in their correct relative position may be adopted.

In figures 8 and 9, the dished discs, *k*, are indicated as secured to the hubs, *o*, by pressing the inner edges of these discs into grooves and subsequently burnishing over the hubs to hold the discs in place.

In the modification shown in figures 10 and 10*a* two dished discs, *k*, are again employed but of thicker metal, their circumferential portions being brought into contact and cross grooves, *b*, being cut in their edges in accordance with the method described above with reference to figures 1 and 1*a*. Again, that portion of the disc carrying the blades, may be built up of a set of thin laminae, *r*, (see figure 11) the edges of which are notched as at *s*, the laminae being assembled in such a way that the notches, *s*, are "stepped" with regard to each other, so that the intervening projections of metal may follow the shape of the turbine blades to be welded to them.

Instead of notching the laminae, they may be prepared in accordance with other of the methods pointed out above, before being assembled in the manner indicated.

In an invention such as the present, it is not practicable to describe every method of carrying its broad underlying principle into effect, but the scope is sufficiently indicated by the many examples given above, and moreover it will be evident without further description, how the invention may be applied to the welding together of turbine blades and carriers of other forms than those described by way of example.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In turbines, the method of welding the turbine blades to the element carrying them, consisting in so adjusting the volume of metal in the blade carrier in the neighbourhood of the welding

point, that approximately equal heating occurs in the two parts, substantially as described.

2. In turbine, blade carrying elements having blades welded thereupon in accordance with the method claimed in claim 1.

3. In turbines, grooving the blade carrier in the neighbourhood of the welding point substantially as and for the purpose described.

4. The bladed turbine element, hereinbefore described with reference to figures 1 and 1*a* of the accompanying drawings.

5. The bladed turbine element, hereinbefore described with reference to figure 2 of the accompanying drawings.

6. The bladed turbine element, hereinbefore described with reference to figures 3 and 3*a* of the accompanying drawings.

7. The bladed turbine element, hereinbefore described with reference to figure 4 of the accompanying drawings.

8. In turbines, forming holes in the blade carrier in the neighbourhood of the welding point, substantially as and for the purpose described.

9. The bladed turbine elements hereinbefore described with refernce to figures 5 and 6 of the accompanying drawings.

10. The bladed turbine element, hereinbefore described with reference to figure 7 of the accompanying drawings.

11. In turbines, building the blade carriers of comparatively thin parts across the non-touching edges of which the blades are welded, substantially as described.

12. The bladed turbine element, hereinbefore described with reference to figures 8 and 8*a* of the accompanying drawings.

13. The bladed turbine element, hereinbefore described with reference to figures 9 and 9*a* of the accompanying drawings.

14. The bladed turbine element, hereinbefore described with reference to figures 10 and 10*a* of the accompanying drawings.

15. In turbines, building the blade carriers of prepared laminae assembled in a "stepped" manner, substantially as and for the purpose hereinbefore described.

16. The bladed turbine element, hereinbefore described with reference to figure 11 of the accompanying drawings.

Dated this 24th day of February, 1904.

MARKS & CLERK,
18, Southampton Buildings, London, W. C.
13, Temple Street, Birmingham, and
30, Cross Street, Manchester.
Agents.

X*a*
F.J.W.
20/4/15.

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LBF

Paper No. 57.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

May 18, 1915.
Mailed " " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

BEFORE THE EXAMINER OF INTERFERENCES.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The Office hereby acknowledges receipt of the stipulation and certified copy of patent to De Ferranti, which were filed May 17, 1915.

EXAMINER OF INTERFERENCES.

Copy
Docket Clerk.
June 16, 1915.
U. S. Patent Office.

36,709—58

Mail Room
June 15, 1915.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

STIPULATION.

It is hereby stipulated and agreed by and between the respective parties to the above-entitled interference that the time for taking

Harmatta's testimony be extended sixty (60) days from the date now set and that the remaining dates be extended accordingly.

TOWNSEND & DECKER,
Attorneys for Harmatta.

("S" and "Notice" in margin.)

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for Ferranti.

New York, June 14th, 1915.

Room No. 261. 2—224

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Paper No. 59.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

June 17, 1915.
Mailed " " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

BEFORE THE EXAMINER OF INTERFERENCES.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed June 15, 1915, is approved and the times herein are extended as follows:

Testimony of Harmatta to close Aug. 17, 1915.

Rebuttal testimony of De Ferranti to close Sept. 1, 1915.

Final hearing November 2, 1915, at 11 A. M.

Notice is given, however, that no further extension of Harmatta's time to take testimony in chief will be granted unless supported by a verified showing setting forth why the testimony could not have been taken within the extension hereinabove allowed.

H. E. STAUFFER,
Examiner of Interferences.

36,709—60

Mail Room
Aug. 12, 1915.
U. S. Patent Office.

Docket Clerk,
Aug. 12, 1915.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

STIPULATION.

It is hereby stipulated and agreed by and between the respective parties to the above-entitled interference that the time for taking Harmatta's testimony be extended sixy (60) days from the date now set and that the remaining dates be extended accordingly.

("G." in margin.)

In support of this request for extending times, attention is respectfully invited to the attached affidavit of Charles F. Tischler Jr.

TOWNSEND & DECKER,
Attorneys for Harmatta.
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.

New York, August 10th, 1915.

Mail Room,
Aug. 12, 1915.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

BEFORE THE EXAMINER OF INTERFERENCES.

AFFIDAVIT.

County of New York, State of New York, ss:

Chas. F. Tischner Jr. being duly sworn, deposes and says that he is a member of the firm of Townsend and Decker, 149 Broadway, New York, attorneys of record for the party Harmatta in the above entitled interference; that the Harmatta patent No. 1,046,066 involved in this interference is being litigated in the Courts and that the claims of Harmatta's patent made the counts of this interference are before the Courts for adjudication; that a decision of the United States District Court for the District of Massachusetts has been rendered by which the Court held the claims of the patent, including the counts of this interference, invalid for want of invention over the prior art (see Thomson Electric Welding Company et al vs. Barney and Berry, Inc. opinion of the Court dated March 10th, 1915, copy of which is attached hereto); that an appeal has been taken from said decision to the Circuit Court of Appeals for the First Circuit; that said appeal was heard by the Court on April 28th, 29th, and 30th, 1915 but that no decision of the Court has as yet been handed down; that it is impossible to determine exactly when the decision will be made but it is improbable now that it will be before October; that the reason for requesting the extension of time for taking Harmatta's testimony in the interference is that the parties should not be required to go to the expense of acually contesting the right to claims which are awaiting determination as to their validity by a Court of last resort especially in view of the decision of the lower Court against the validity of the claims and that the request is not made for any purpose of delay except that specified.

CHAS. F. TISCHNER JR.

Subscribed and sworn to before me this 10th day of August, 1915.

W. R. WARNER,
Notary Public.

(Seal)
Notary Public, Bronx County.
Cert. filed in N. Y. Co. No. 107.
New York Register No. 7120.
Term expires March 30, 1917.

Mail Room,
Aug. 12, 1915.
U. S. Patent Office.

DISTRICT COURT OF THE UNITED STATES,

DISTRICT OF MASSACHUSETTS.

IN EQUITY.

No. 434.

THOMSON ELECTRIC WELDING CO., et al.

vs.

BARNEY & BERRY, Inc.

ON PLEADINGS AND PROOFS.

OPINION OF THE COURT,
March 10, 1915.

DODGE, J.—

The Thomson Electric Welding Co. owns U. S. Patent No. 1046066, for improvements in electric welding, issued to Johann Harmatta December 3, 1912, upon his application filed December 3, 1913. It acquired Harmatta's rights in February, 1912, while his application was still pending. The other plaintiff, Universal Electric Welding Co., is and has been since 1909 exclusive licensee under all patents then or thereafter owned or controlled by the Thomson Co., including the patent whereon the present suit is brought.

There are 21 claims in all, the first 16 being for a method or process described, and the last 5 for the product thereof. Infringement of all the claims is charged, but the plaintiffs ask the Court to consider only 8 of the process claims (Nos. 3-6, 8, 9, 11 & 12) and only 4 of the product claims (Nos. 17, 18, 19, 21). The defences are, lack of invention, anticipation, invalidity because of changes made in the application before issue, and non-infringement.

Introductory statements in Harmatta's specifications are that his invention relates to the manufacture of metal articles of all kinds and consists in a novel method of fastening their component

parts together by the process of electric welding; also in the new article produced thereby. The invention is further said to afford a cheap and practical substitute for riveting.

Consideration of former methods of uniting metal by electric welding is therefore required in order to determine the precise scope of Harmatta's invention. For the purposes of such inquiry, his own definition of "electric welding" may be adopted. He says in his application,

"By the term 'electric welding' as used herein I mean that well known process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure,"

and this is immediately followed by his express disclaimer of

"Those processes of fastening pieces of metal together in which the parts are heated and practically melted down by an electric arc generated on the back of the piece by 'drawing' an arc by means of the electrode, as well as other processes in which the welding heat is generated externally and electrically in a resistance material and is imparted to the work by heat conduction from said resistance material in contact with the work."

The electric welding art may be said to have begun with the inventions of Elihu Thomson, disclosed in two U. S. Patents issued to him on Aug. 10, 1886,—Nos. 347140 and 347141. The first of these describes the process of "butt-welding", wherein the ends of wires or bars, held by suitable electrodes, are butted together under pressure, raised to welding heat by an electric current of small voltage and large volume passed through them from one electrode to the other, and caused to unite into one mass over their entire area of contact, while thus plastic, by the pressure applied. A slight burr or flange of metal, extruded while plastic at the junction point, is left in the welded article. The second of the above patents covered the apparatus for carrying out the process described in the first.

Five years later (Jan. 20, 1891) another U. S. Patent No. 444,928, was issued to Thomson; covering a process of joining two strips, sheets, plates or bars of metal by continuous electrically welded seams. Roller electrodes were used, between which the two strips or sheets to be joined were fed during the passage of current from one to the other. Suitable pressure devices enabled opposed electrodes to hold the two strips or sheets in close contact between them at the point of the current's passage. The use of roller electrodes permitted an uninterrupted current to be passed through all points within the line of the desired seam successively

and without relaxation of the pressure. Electrodes not provided with means to permit this could not have produced a continuous seam, but only, at most, a series of more or less frequent welds along its line, each requiring separate application and interruption of pressure and current.

A still later U. S. Patent to Thomson,—No. 496019, issued April 25, 1893, covered a process of soldering (instead of welding) two overlapped sheets of metal together by the passage of current through them, so as to produce the necessary heat where the desired junction was to be made, between two electrodes arranged to hold them there in contact while the current passed. Less heat and therefore less current is required for soldering than for welding. The process described in this patent might have been used to produce a welded instead of a soldered union between the sheets merely by an increase in the amount of current passed between the electrodes.

All the above patents have belonged to the Thomson Co. since their issue. The two "butt-welding" patents expired Aug. 10, 1903, shortly before Harmatta's application was filed. There was reference to them and to others of the above patents in the patent in suit, made in connection with the patentee's statements of the scope of his invention.

The patent states that in general terms the invention may be said to consist.

"In fastening the pieces together by an electric weld at one or more distinct or well defined spots, each of small area or extent in their juxtaposed or opposite plane faces, by the application of pressure and heating current localized in such spots, and in the special method of localizing the heating and pressure in the spot or spots as hereinafter described," &c.

The substance of the description then following is contained in the following passage quoted from the plaintiff's brief.

"Harmatta's invention may be done described:

Two comparatively thin sheets of metal can be joined together by one or more isolated welds in their meeting surfaces made by applying electrodes of limited facial area to the backs of the sheets, pressing the electrodes and sheets together, and passing a welding current from one electrode to the other, whereby a weld is made between the sheets at the spot, the area of which is determined by the area of the electrodes in contact with the metal sheets."

The patentee's references to former patents are:

"It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces.

It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces."

"I am also aware of patent to H. F. A. Kleinschmidt, No. 616436, dated December 20, 1898, and do not wish to be understood as claiming anything disclosed in said patent."

The patent here referred to does not appear to have belonged, like the others, to the Thomson Co., but to the Loraine Steel Co. whereof Kleinschmidt was an employee. In using his patented method commercially, however, he testified that he used an electric welding machine made by the Thomson Co. His patent covers a process of attaching splice bars to rails. Two splice bars, each having on one side three projections or "bosses", one at each end and one in the middle, are placed, one bar against each side of the abutted rails, so that their projections are opposite each other and their middle projections opposite the junction of the rails. Their contact with the rails is through their projections only. Electrodes of much greater facial area than the projections are applied against the backs of the splice bars opposite each pair of projections. Pressure applied to the electrodes in the direction necessary to force them toward each other, holds the webs of the rails and the splice bar projections in contact with the electrodes and each other; the required current transmitted between the electrodes heats the projections and so much of the webs of the rails as lies between them at the contact points, the welding heat, and the pressure applied as above causes union at those points.

To the remaining patents in evidence as part of the prior art, briefer reference will be sufficient. Of U. S. Patent 363320 to Bernardos and another May 17, 1889; and the German Patent to Benardos 50509, Feb. 19, 1890, it is enough to say that neither relates to electric welding in the same sense of the patent in suit, and that both processes described are of the kinds expressly disclaimed by Harmatta, as above.

U. S. Patent No. 670808 to Perry, March 26, 1901, covers a method and machine for electrically welding the rods or wires of metallic fencing at their crossing points, by a simultaneous application of mechanical pressure and electrical current at those points. The similarity of what is described to the process of the patent in suit is at most general and not more significant, for the purposes of the questions presented, than in the case of the Thomson and Kleinschmidt patents already mentioned.

U. S. Patent to Hunter, No. 690958, Jan. 14, 1902, is for a method of electrically welding together similar sheets of metal at their ends so as to produce water-tight joints between them and from them continuous lengths for roofing purposes. Pressure and current are simultaneously applied to melt and unite the metal of the sheets at a series of points determined by projections previously

formed in one and arranged to contact with the other sheet along the desired line of junction. The metal, melted where each projection contacts with the other sheet, spreads to unite with that at the next projection and thus to form a full transverse weld. No such spreading of molten metal is contemplated by the process of the patent. Except that metallic sheets are to be joined instead of rails, I find no resemblance in this process to that of the patent more significant than in the case of the Kleinschmidt patent.

The plaintiffs say that Harmatta's method of joining comparatively thin sheets of metal by isolated welds, made in the manner described, "was a radically new idea."

But so far as he did no more than employ simultaneously the passage of electric current to bring the work to welding temperature at the place of contact by its own resistance, and application of welding pressure at the same place, he introduced no idea at all. All this, if not necessarily involved in the terms of his own definition of "electric welding", is certainly to be found in each one of the inventions disclosed in the various patents before mentioned which make use of that process. His new idea, if any, must be something beyond this.

The plaintiffs contend that localizing the current by pressure in a particular limited area of the contacting surfaces of the work, determined by the area of the applied electrode, and thereby bringing that limited area to a welding temperature without material heating of the adjacent parts, was new with Harmatta. It is said that by localizing the pressure at the selected limited area of the work, he thereby reduced the resistance, concentrated the current and increased its welding power within that area; securing at the same time, by means of the pressure upon the softened metal within the same area, the desired molecular union there between the two sheets. But all this is necessarily accomplished at every point successively along the line of the continuous electrically welded seam made by the process of Thomson's patent No. 444,928. It must also be accomplished, so far as I can see, in every case of an electric weld covering less than the whole area of the surfaces joined, made under pressure exerted between the two electrodes. The passage of current and heating of the metal must occur at those places within which the resistance is most diminished by the pressure. Claims drawn upon the theory that such localization of pressure, current and heating were new with Harmatta appear to have been repeatedly rejected and cancelled in the Patent Office before his patent issued.

The prior art thus leaves no room, so far as I can see, for crediting Harmatta with any idea beyond that of making his electric welds small in area, rather than large, in comparison with the areas of the opposed surfaces to be joined, and isolating them so as to leave each surrounded by a comparatively large area of unwelded surface. Although his patent states that a weld formed by his

process is distinguished from prior welds, "among other things," in the above respects, these are the only respects which he specifically mentions and they are in my opinion the only respects in which any distinction can be said to exist.

It is difficult to regard the above as an inventive idea. Referring again to the Thomson patent No. 444,928, the process therein described, which it is said to be "especially applicable to the welding of plates together at their edges, instead of riveting," is just as applicable to the welding of plates or sheets at other places within their area as at their edges. The roller electrodes employed, when brought together on each side of the work, and until something more is done, will pass the elctric current and make the weld at the spot or point of pressure and nowhere else. (See claim 1 of the patent referred to.) If, having there made the weld, they should be again separated, instead of having the work fed between them while their pressure upon it continued, they would leave an isolated spot weld joining the plates and be in readiness to make another weld isolated from the first by any desired area of unwelded surface.

The plaintiffs say that although machines were built to carry out the roller process of the last mentioned patent, they were not practically successful and that the process has proved a failure so far as commercial success is concerned. Their evidence tends to support this contention and to show that there are practical difficulties attending the use of the process. But so far as the question raised is important, I think the plaintiffs' evidence tending to show want of success is fully met by that of the defendant; according to which the process has been successfully carried out by machines built and commercially installed by at least two different concerns. Samples of the work they have produced by using it are among the exhibits in the case and there is nothing to show that such work is unsatisfactory in character.

The presumption of validity arising from the issue of the patent seems to me entitled in the present case to less than the usual weight in view of the history of the Patent Office proceedings upon Harmatta's application, as disclosed by the file wrapper and contents in evidence. As has appeared, the application was pending for ten years before the patent issued. As originally filed, the application described a process of roller welding substantially like that of Thomson, with the statement toward the close of the specification that instead of introducing the piece to be welded gradually between the electrodes, the welding apparatus might be arranged to slide relatively to them; and that if required to weld sheets only at particular places, apparatus employing electrodes having the form of pins might be used, instead of the roller electrodes, to produce "a small, round, very sharply defined place of welding", answering the purposes of a rivet. There were two claims covering roller welding and two others not thus limited. The idea of roller welding thus appears to have been, with Harmatta, the foundation and

origin of his further idea of spot welding; and his further idea to have consisted in nothing more than stopping with the first point welded instead of continuing it into a welded line.

Harmatta's roller-welding claims having been rejected in view of Thomson's patent, and cancelled on May 14, 1904, with so much of his original specification and drawings as related to them his application became and thereafter continued to be an application covering "spot welding" only. The original claims covering it, however, soon disappeared and there were further successive rejections, cancellations, amendments and substitutions of new claims, in 1904, 1905, 1906, 1907 and 1910. Meanwhile patent No. 928,701 issued on July 20, 1909, to Rietzel, on an application owned by the Thomson Co. March 31, 1910, Harmatta copied some of the Rietzel claims, at the suggestion of the Patent Office, in order that an interference might be declared. After this had been done, on April 26, 1910, Harmatta added still other Rietzel claims to his application and it was acquired also by the Thomson Co., pending the interference, in February 1912. The interference was decided in his favor in October 1912, but before the issue of the patent, still another cancellation and substitution of a new specification, with new claims was found necessary, wherein the invention was for the first time stated to consist in having the welds small and surrounded by comparatively large areas of unwelded surface.

All this may be regarded as significant on the question of patentable novelty (Richmond v. Atwood, 48 F. R. 910, 913); and it seems sufficient to indicate, at least, that only with unusual difficulty was Harmatta able to suggest or the Patent Office to find in his spot welding process, however described, anything capable of being regarded as patentably new in view of the prior art.

Under its butt-welding patents and roller welding patent the Thomson Co. appears to have had a complete monopoly of electric welding. The latter patent expired Jan. 20, 1908. While the monopoly continued, electric welding machines could be had only under lease from the Thomson Co., restricting their use to specified articles. In 1908, the Toledo Electric Welder Co., which made the machine which the defendant uses, and is defending this suit, began to make and introduce machines for spot-welding. Other concerns followed in 1908, 1910 and 1911, all acting without knowledge of previous applications by Harmatta or others for patents covering the spot-welding process. Under these circumstances it can hardly be said that, upon the question of patentable novelty in anything invented by him, Harmatta is supported by any advantages which the development of spot welding since 1908 has shown to reside in the process, or by any commercial success it has attained. I do not think the facts shown entitle him to say that by his alleged invention, as he was finally obliged to define and limit it, he was the first to supply a wide spread demand not previously met.

The defendant's use of the Toledo machine which is here com-

plained of as an infringement, is in the manufacture of skates. The greater part of the work done by the machine is in uniting two strips of metal, each forming half of a skate runner, by successively made, contiguous, overlapping, spot electric welds, small in size, which together make a practically continuous weld from one end of the runner to the other. The process is carried on with such rapidity that one weld has hardly begun to cool before the welding adjoining is made. The completed row of welds is thus, for all practical purposes, like a continuous seam weld produced by the use of roller electrodes. The welds of which it is composed are neither isolated nor separated by comparatively large areas of unwelded surface. I do not see how, in any case, the patent could be so construed as to make this method of welding an infringement. If not, to sustain the patent involves leaving the question of infringement to depend merely upon the amount of unwelded area left between the welds; and this result seems to me to afford a further reason against holding it valid.

My conclusion must be that the process described in the patent does not involve invention, in view of the prior art. There may be a decree dismissing the bill, with costs.

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Washington, D. C.,"
and not any official by name.
JHD

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

August 13, 1915.
Mailed August 13, 1915.
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

BEFORE THE EXAMINER OF INTERFERENCES.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

The stipulation filed August 12, 1915, is approved, and the times are extended as follows:

Testimony of Harmatta to close October 18, 1915.

Rebuttal testimony of De Ferranti to close November 2, 1915.

Final hearing January 4, 1916, at 11 A. M.

LOUIS E. GILES,
Acting Ex'r. of Intfs.

36,709—32

Mail Room,
Oct. 11, 1915.
U. S. Patent Office.

Oct. 11, 1915.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

Re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

STIPULATION.

It is hereby stipulated and agreed by and between the respective parties to the above-entitled interference that the time for taking Harmatta's testimony be extended thirty days (30) from the date now set and that the remaining dates be extended accordingly, the Commissioner of Patents consenting.

TOWNSEND & DECKER,
Attorney for Harmatta.
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

New York, October 7th, 1915.

36,709—33

Docket Clerk.
Oct. 11, 1915.
U. S. Patent Office.

Mail Room
Oct. 11, 1915.
U. S. Patent Office.

(Printed Letter-Head Omitted)

New York, October 7th, 1915.

Hon. Commissioner of Patents,
Washington, D. C.

Attention of MR. STAUFFER,
Exmainer of Interferences.

SIR:

Re: Interference de Ferranti vs. Harmatta, No. 36,709.

We enclose herewith stipulation for an extension of Harmatta's

time for taking testimony in this case for a period of thirty days from the date now set.

The writer spoke to Mr. Stauffer in Washington the other day and explained this matter to him but on that day an opinion was handed down by the Court of Appeals for the First Circuit in the infringement suit referred to in the writer's affidavit accompanying the stipulation dated August 10th 1915. In this opinion the Circuit Court of Appeals reverses the lower court and holds the claims of the Harmatta patent involved in this interference valid. As explained to Mr. Stauffer at that interview, the time is now so short, even though the decision has already been rendered, for us to prepare our case for the interference as we have not yet had an opportunity to thoroughly examine the opinion of the Court, it will be impossible for us to prepare and take our proofs within the time now set. As understood by the writer, Mr. Stauffer consented to the granting of a further extension under the circumstances.

Very respectfully,

TOWNSEND & DECKER.

CFT/IL
Enc.

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and not any official by name.

Paper No. 34.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

October 12, 1915.
Mailed " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

BEFORE THE EXAMINER OF INTERFERENCES.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

The stipulation filed herein October 11, 1915, is approved and times are extended as follows:

Testimony of Harmatta to close November 18, 1915.

Rebuttal testimony of De Ferranti to close Dec. 3, 1915.

Final hearing: February 3, 1916, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—35.
Oct. 28, 1915.
U. S. Patent Office.
Mail Room.
October 28, 1915.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

New York, October 27th 1915.

Messrs. Spear, Middleton, Donaldson & Spear,
Victor Building,
Washington, D. C.

Sirs:

PLEASE TAKE NOTICE that on Thursday, the 4th day of November, 1915, at 10 o'clock a. m. or as soon thereafter as counsel may be heard before the Examiner of Interferences, we shall move to transmit the accompanying motion for dissolution of this interference to the Law Examiner for his determination and shall also move for a stay of proceedings pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys for Harmatta.

AFFIDAVIT OF SERVICE.

County of New York, State of New York, ss:

Remington A. Scott, being duly sworn, deposes and says that he is a clerk in the office of Messrs. Townsend & Decker, 149 Broad-

way, New York; that on October 27th 1915 he deposited with the Post-Office authorities at New York City, New York, and caused to be sent prepaid, by registered mail, a sealed envelope addressed to Messrs. Spear, Middleton, Donaldson & Spear, Victor Building, Washington, D. C., as per attached registry slip, which envelope contained a copy of the accompanying motion papers.

REMINGTON A. SCOTT.

Subscribed and sworn to before me this 27th day of October 1915.

GEORGE E. BROWN,
Notary Public.

(Seal)

Notary Public—Richmond County Certificate filed in New York County, No. 179.

New York register No. 7223.

Term expires March 30, 1917.

No. 53905 Receipt for Registered Mail.

Postmark.
New York, N. Y. (Hudson Term. Sta.)
Registered Oct. 27, 1915.
——class postage prepaid. Postmaster, per G C

Mail Room.
Oct. 28, 1915.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

MOTION FOR TRANSMISSION.

NOW COMES JOHANN HARMATTA, by his duly authorized attorneys and moves that the Honorable Examiner of Interferences transmit the accompanying motion for dissolution of this interference to the proper Law Examiner for his determination and refer to the annexed affidavit of Charles F. Tischner, Jr., in support thereof.

It is also moved that a stay of proceedings be granted pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, N. Y., October 27th 1915.

Mail Room.
Oct. 28, 1915.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

AFFIDAVIT.

CHARLES F. TISCHNER JR., being duly sworn, deposes and says that he is a member of the firm of Townsend & Decker, attorneys of record for Harmatta in the above-entitled interference; that he has personal charge of this case; that it was impossible to move to dissolve on the ground now made in the present motion at the time of bringing Harmatta's original motion to dissolve in this case for the reason that the patent of Ferranti made the subject of the present motion was not issued at that time; that since the issuance of the said patent, to wit: July 27th 1915, this interference has remained quiescent for reasons appearing of record in the case, to wit: the fact that a decision of the United States Circuit Court of Appeals on the validity of the claims of the Harmatta patent involved in this interference was being awaited; that the opinion of the said Court holding the claims valid was rendered the early part of the present month; that since that time deponent has been busy preparing for the presentation of the case for the party Harmatta in this interference; that deponent believes a valid patent could not issue to de Ferranti on the subject-matter of this interference even should he prevail in the interference on account of the newly discovered bar thereto, to wit: the patent referred to in the accompanying motion papers to dissolve the interference; that such question should be passed upon before subjecting the parties hereto to the expense of an actual contest and that the present motion is made in good faith and not for the purpose of delay.

CHAS. F. TISCHNER JR

Subscribed and sworn to before me this 27th day of October, 1915.

GEORGE E. BROWN,
Notary Public.

(Seal)

Notary Public—Richmond County Certificate filed in New York County, No. 179.
New York register No. 7223.
Term expires March 30, 1917.

Mail Room.
Oct. 28, 1915.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE LAW EXAMINER.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

MOTION TO DISSOLVE.

NOW COMES JOHANN HARMATTA, a party to the above-entitled interference, by his attorneys, and moves that the interference be disolved on the ground:

That the United States patent issued to Sebastian Ziani de Ferranti, one of the parties to this interference, on the 27th day of July 1915, No. 1,148,221, for Process of Electrically Welding Turbine Blades, constitutes a bar to the grant of a patent to said de Ferranti on the subject-matter of this interference for the reason that the invention covered by the aforesaid patent is the same as the invention covered by the application of de Ferranti as involved in this interference: that the claims of the interference as made by de Ferranti are based on the same disclosure as that of the aforesaid patent and that the disclosure of the application upon which Ferranti is now seeking a patent is in no manner different from or additional to the disclosure of said patent: that the claims in the said patent and the claims forming the counts of this interference merely differ in scope and for that reason a patent could not be granted to de Ferranti on his application involved in this interference for the

reason that it would be a mere double patenting of the invention patented by said issued patent No. 1,148,221.

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, N. Y., October 27th 1915.

Room No. 261. 2—224 Paper No. 36.
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name.
GML.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

November 6, 1915
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
6—1652 *Commissioner of Patents.*

This case is before me on motion by Harmatta filed October 28, 1915 to transmit motion to dissolve.

The interference has been pending over two years and the motion comes therefore long after the time allowed by the rule for the presentation of motions of this character. Harmatta is involved upon patent No. 1,046,066. He moves to dissolve on the ground that De Ferranti has already obtained a patent for what is in substance the same invention as that involved herein and that it would be double patenting to grant the same party another patent for the subject-matter of this interference.

Transmission is objected to because of the delay in bringing the motion. It appears that patent No. 1,148,221 upon which motion is based, issued July 27, 1915. The present motion was not brought until three months after. There is no sufficient excuse why the motion could not have been presented earlier. Transmission is also objected to on the ground that Harmatta should not be permitted to urge the question of double patenting, but rather that this should be regarded as an *ex parte* question between De Ferranti and the office.

It seems to me that both objections are well taken. With respect to the first objection, it must be held that no sufficient explanation is given for the failure to bring the motion earlier. With respect to the second objection, it must be held that this is also well founded. De Ferranti is an applicant and he is entitled to contest with Harmatta the question of priority of invention. Even if as contended he has no right to a patent upon the application involved herein, there is apparently no reason why he may not at once file an application for the reissue of his patent No. 1,148,221. If Harmatta's contention is well founded to the effect that the subject matter of that patent and the subject matter herein issued are substantially the same, apparently the residue could be allowed.

Motion to transmit is denied.

Limit of appeal, November 17, 1915.

The taking of testimony is suspended.

H. E. STAUFFER,
Examination of Interferences.

Mail Room. Intf. No. 36,709. Paper No. 37.
Nov. 16, 1915.
U. S. Patent Office.
Docket.
Nov. 16, 1915.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTI.

No. 36,709.

APPEAL TO THE HON. COMMISSIONER OF PATENTS.

The party Harmatta to the above-entitled Interference hereby appeals to the Honorable Commissioner of Patents in person from

the decision of the Examiner of Interferences rendered November 6th 1915 refusing to transmit to the Law Examiner the motion to dissolve brought by Harmatta.

The following are assigned as the reasons of appeal:

1. The Examiner was in error in refusing to transmit the motion to dissolve on the ground that no sufficient reason was given as to why the motion could not have been presented earlier.

2. The Examiner was in error in refusing to transmit the motion to dissolve on the ground that the question raised by the motion is merely an ex parte question between de Ferranti and the Office.

3. The Examiner was in error in refusing to transmit the motion to dissolve on the ground that Ferranti could obtain a reissue of his patent No. 1,148,221 referred to in the motion.

4. The Examiner was in error in refusing at all to transmit the motion to dissolve.

TOWNSEND & DECKER,
Attorneys for Harmatta

New York, November 15th 1915.

Rec. Vol. 118, Page 306.

DE FERRANTI

vs.

HARMATTI.

INTERFERENCE No. 36,709.

The office has no jurisdiction to try out a question of priority where one of the parties is a patentee unless the other party, if successful, is entitled to a patent; for a proceeding by an applicant who is not entitled to a patent conducted with the aim of establishing priority of invention over the patentee would be a mere attack upon the validity of the patent which must be made, if at all, in defense of a suit for infringmen.

If it should be established that de Ferranti may not obtain a patent upon the present application because the subject-matter thereof is the same as that of his patent, he could perhaps cover the same matter by a reissue application, but an interference can be declared only after the reissue application has been filed.

As to Harmatta's delay in bringing the motion, the fact that his patent was held invalid in the district court in Massachusetts, and that the appeal heard last April was not decided until October is regarded as a sufficient excuse. Had the lower court been sustained, there would be nothing to fight about.

The decision of the Examiner of Interferences is sustained.

THOMAS EWING,
Commissioner.

December 2, 1915.

Rec. Vol. 118, Page 306. SET

DE FERRANTI

vs.

HARMATTI.

INTERFERENCE No. 36,709.

It has been called to my attention that in the opinion of December 2, the Examiner of Interferences is sustained, whereas it was intended that he should be reversed.

The opinion is accordingly corrected and the Examiner of Interferences is reversed.

THOMAS EWING,
Commissioner.

December 6, 1915.

EEG 2—201 Paper No. 38.

Address only
The Commissioner of Patents,
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON.

November 19, 1915.

Sir:

The Case of

DE FERRANTI
vs.
HARMATTA

APPEAL ON MOTION.

Interference No. 36,709, will be heard by the Commissioner on the 2nd day of December, 1915.

The hearings will commence at ten o'clock, and as soon as the argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is

called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;

Motions, thirty minutes, each side;

Interference appeals, final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in interference cases, and in such case a full and fair opening must be made.

Briefs in interference appeals must be filed in accordance with the provisions of Rule 147.

Respectfully,

THOMAS EWING,
Commissioner of Patents.

To S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
To Johann Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Docket Clerk. No. 36,709, Paper No. 39.
Dec. 2, 1915.
U. S. Patent Office.

UNITED STATES PATENT OFFICE,

BEFORE THE HONORABLE COMMISSIONER OF PATENTS ON APPEAL.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

BRIEF FOR HARMATTA.

This case comes up on appeal before your Honor by the moving party Harmatta from the decision of the Examiner of Interferences dated November 6th 1915, refusing to transmit the motion to dissolve filed October 28th 1915 by the party Harmatta. Transmission of the motion was refused first, on the ground of delay in presenting it and second, on the ground that the question raised by the motion, that is, double patenting, should be regarded as an ex parte question between de Ferranti and the Office.

STATEMENT OF THE CASE.

Harmatta, the senior party to the interference, is a patentee, and de Ferranti, the junior party, is an applicant, he having copied cer-

tain broad claims from the Harmatta patent No. 1,046,066 involved in this interference for the purpose of contesting priority thereof with Harmatta. Harmatta's patent involved in this interference was issued on December 3rd 1912 on an application filed December 3rd 1903. De Ferranti's application involved in this interference was not filed until December 29th 1911 as an alleged division of an earlier application of his filed May 14th 1904. The claims of the interference are for a process of electric welding now broadly known as "spot welding." On July 27th 1915 de Ferranti, the junior party to this interference, had issued to him a United States patent No. 148,221 for Process for Electrically Welding Turbine Blades, this being the patent issued on the original application of which Ferranti's application directly involved in this interference is alleged to be a division. Figures 1 and 2 of this patent are the same as the figures of the Ferranti application in the interference. The claims of the patent are for a process or method based on the disclosures of Figures 1 and 2 which are also the subject of the pending application.

The substance of the motion now brought by Harmatta to dissolve the interference is that the issuing of a patent to de Ferranti for the invention claimed in his application declared to be in interference with Harmatta would effect a double patenting of the invention already patented to de Ferranti by his Letters Patent No. 1,148,221.

DELAY IN PRESENTING MOTION.

De Ferranti, the junior party, has closed his proofs but has not actually taken any testimony, he having merely introduced a certified copy of a British Provisional application alleging to disclose the subject-matter of the interference, so that it cannot be contended that Ferranti has been put to any material needless expense in trying out the question of priority which could lead to the contention that the interference should be decided on priority and not dissolved.

The time for taking Harmatta's case has not yet terminated but likewise he has not yet actually taken any testimony. While the interference may have been pending for a period of two years, it having been declared on the 7th of October 1913, yet, nevertheless, the present motion could not have been brought within the time called for by the rules for the reason that the Ferranti patent which warrants the bringing of the motion was not issued until July 27th 1915. Harmatta's attorneys became aware of the issuance of this patent about the first part of September 1915 but at this time the interference practically stood suspended for reasons which appear of record in this case, to wit: The Harmatta patent involving the claims of this interference was being construed by the United States Courts as to its validity and a decision of the United States District Court had already been rendered declaring all the claims of the patent invalid for want of invention over the

prior art. An appeal from that decision was filed and argued in April of the present year and the decision of the United States Circuit Court of Appeals was not yet handed down but was being awaited from day to day. Having a decision against the validity of the claims, it did not seem justice to compel prosecution of the interference at least until the nature of the decision of the Court of Appeals was learned, especially as the appeal had been argued some time before and the result thereof was daily expected. For this reason Harmatta was obtaining extensions of his time for taking his case in this interference and, as above stated, at the time of knowledge of the issuance of the Ferranti patent, to wit: September, the interference was practically suspended.

In the early part of October 1915 the opinion of the Circuit Court of Appeals on the Harmatta patent was handed down, by which opinion the Court reversed the decision of the lower Court and held the claims valid. The attorneys for the party Harmatta immediately then took up the interference for active prosecution and, it being concluded that the issuance of the aforementioned patent to Ferranti formed a complete bar to Ferranti's obtaining a patent on the subject of his present application, the present motion to dissolve was filed on October 28th 1915.

It is thought that under the circumstances of the case the delay is not an unreasonable one and is not one which Harmatta should be chargeable with. Even though there may have been some delay in presenting the motion, the delay at most has not been a very material one which can, in justice, be charged against Harmatta. The fact remains that the parties have not as yet been put to any expense of actually contesting the interference and, as it is the strenuous contention of counsel for Harmatta that the Ferranti patent already issued absolutely prevents him from obtaining a valid patent on the subject of the interference, it would be an injustice and cause the expenditure of needless moneys and time to continue the interference.

Merits of the Motion to Dissolve.

As the Examiner of Interferences has also refused transmission of the motion for reasons affecting the merits thereof, it is thought advisable to at this time refer in as brief a manner as possible before your Honor to Harmatta's contentions as to why or how the Ferranti patent referred to forms a complete bar to the obtaining of a patent by Ferranti on the subject of the interference. In the issued patent Ferranti describes and claims a certain method of electrically welding turbine blades to their carrying element. In his application involved in this interference he claims the method of electric welding which is based on the same identical process as that claimed in the patent, the wording of the claims of the application, however, being different than the wording of the claims of the patent although both are drawn to processes. The claims of the application are broader in scope than those of the patent and if

granted in a patent to Ferranti with a construction broad enough to cover the process he discloses, would be to grant to Ferranti an extension of the monopoly previously granted to him by his issued patent No. 1,148,221.

It is absolutely correct to say that in his patent No. 1,148,221 referred to in the motion, Ferranti claims his same substantial method or process that he claims in his application in interference and that there is no difference in the two methods to be inferred merely because in the patent he defines the process by reference to the result of welding onto the projections. In other words, in the application in interference the invention claimed is a method or process of welding done by welding to projections while in the patent the method or process is identified by the necessary physical action which takes place in the operation of welding to the projections.

In reaching a satisfactory conclusion on this matter it must be borne in mind that the drawings and specifications of the application and patent are substantially alike; that the one describes no other or different operation than that described and set forth in the other; that the two are based upon the same identical original application; that they do not bear the relation to one another of invention and improvement; that the claims, though in different words, refer to exactly the same practical operation and are founded upon the invention as disclosed in the original application and that the patent claim differs from the application claim only in describing a function of the operation omitted from the application claim. Assuming that it were true, which does not appear to be the case, that one might perhaps modify the operation as claimed in the application so that the normal equalization of the heat capacity would not take place, it nevertheless remains true that no such suggestion or modification of operation is in any manner suggested in either specification or in the drawings of either case. In other words, *the process or operation patented by the patent is the same as that which the applicant seeks to patent by the application.*

It seems to us clear that the matter sought to be covered by the patent is inseparably involved in the matter sought to be covered by the application; that the patent and application are in fact for the same substantial invention and that the circumstances of this case are exactly parallel to the leading cases of Thomson-Houston Electric Co. vs. Housic Railway Co., 82 Fed. 461, Circuit Court of Appeals, 2nd Circuit, Thomson-Houston Electric Co. vs. Jeffrey Mfg. Co., 101 Fed. 121, C. C. A., 6th Circuit, which have been followed in numerous other cases and which were founded upon decisions of the Supreme Court of the United States rendered on substantially the same state of facts in the case of Miller vs. Mfg. Co., 151 U. S. 198. We also cite:

Plummer vs. Sargent, 120 U. S. 442;
Lock Co. vs. Mosler, 127 U. S. 354;
McClain vs. Ortmeyer, 141 U. S. 419;

Palmer Pneumatic Tire Co. vs. Lozier, 90 Fed. Rep 732;
Thomson-Houston Co. vs. Black River Co., 124 Fed Rep. 501;
Malby Electric vs. Thomson-Houston, 148 Fed. Rep. 845;
Thomson-Houston vs. Western Electric, 158 Fed. Rep. 813.

Under the authority of these cases the Patent Office is confronted with the condition that de Ferranti has now obtained a patent for the actual invention for which he is seeking a patent by the application in interference and that said patent must stand as an effectual bar to the grant of a patent upon the application. In principle the circumstances and conditions now confronting the Commissioner on the state of facts arising from the act of the applicant in taking the patent are in no wise different than they would be if it should be discovered that the invention had been patented to some other person or even to the applicant himself by a previous patent granted prior to any date of invention appearing in this record either by the application on record or by allegation of the preliminary statement and that both parties now having obtained a patent it is the plain duty of the Commissioner to terminate this interference, leaving the party Ferranti to take such step or steps as he may be advised are necessary in order to protect his rights. It was suggested, by counsel for Ferranti at the hearing below, that the difficulties of the situation might be cured by the filing of a disclaimer, but what kind of a disclaimer would be applicable to these circumstances and whether or not the case is one for disclaimer under the law, or whether in fact a disclaimer in one of two patents conflicting in being for the same invention would operate to make the other valid, and whether or not any actual disclaimer has been filed or will be filed, are matters upon which the Commissioner is not called upon to pass at this stage of the case or under the status of the record as now presented to the Commissioner. What the applicant may choose to do lies wholly within his own mind and is subject wholly to future action on his behalf. It does not seem to us proper that the Commissioner should endeavor to anticipate that action either in respect to the matter of disclaimer or in respect to the possibility of a reissue as suggested by the Examiner of Interferences. The applicant has not filed a reissue and whether he will do so or not is a matter resting wholly in the fututre upon his own will and upon some approved course of action to be determined upon by himself or his attorneys.

The fact is that the patent stands at present as an effectual bar to the grant of a patent to Ferranti upon the application and it is not to be supposed that the Commissioner will decide the present matter upon the facts before him by endeavoring to anticipate which of two courses of action the applicant may take to remedy the difficulty in which he has placed himself, if indeed there be any difficulty, or by endeavoring to anticipate what decision he would render in the case of some disclaimer the actual nature of which can

only be disclosed when the disclaimer is filed, or what his action would be in case the applicant should file an application for reissue, the actual nature of such reissue or the grounds upon which it should be sought being only before the Commissioner in shape for his decision when the reissue application is actually filed.

Neither the above suggestion of de Ferranti's attorney nor the suggestion of the Examiner of Interferences can be adopted as a ground for a decision upon the present state of facts, for it would require the Commissioner to speculate as to the nature and effect of some future action of the applicant de Ferranti.

Aside from any question of delay, this case is one plainly calling for the exercise of the supervisory power of the Commissioner to prevent the carrying on of an entirely useless proceeding in view of the circumstances now existing and making a condition of affairs brought about solely by the action of the applicant Ferranti himself. Only by resort to speculation as to what applicant might do or what might be legally done and by making this case practically a moot case, can there be found any justification for continuing the present proceeding upon the existing state of facts.

Some suggestion has been made that the objection that the invention covered by the patent and that covered by the application are inseparably involved may be avoided on some theory that the patent is for a method of attaching turbine blades and that in the application claim no reference is made to attaching turbine blades. In our view this suggestion has no merit and does not remove the difficulty. The argument seems to be simply that a lawful line of separation of patent and application is found in the fact that the patent claims one use or application of the process and that the application claim is not limited in terms to that use. A mere statement of the argument seems to us to carry its own confutation. We never yet heard of a case in which a Court has been asked to find a line of division between two patents or claims, so that both patents may be declared valid, upon the argument that one calls for or specifies the only use or application of the invention that is set forth by the inventor while the claim of the other is distinguishable only from the first as a claim of invention in failing to state that use or application, thereby covering all uses including the one specified. In fact sufficient ground for the rejection of this argument is found in the repeated refusals of the Patent Office and the Courts to recognize the validity of two patents founded upon the same description and specification where one patent claims the invention generically and the other claims the same and no other invention specifically. Numerous cases on this proposition might be cited but even apart from that, it is self-evident that the inventions do not become different merely because the patentee recites in one the principal and practically the only proposed use of his invention, while in the other he claims his invention without particular reference to that principal and useful application of the same.

It is self-evident that in any event the present is not a case for

resort to the use of a disclaimer for the reason that the matter of the patent and application are inseparable as patentable matters and disclaimers are only permissible under the Statute and the patent law in cases where the matter disclaimed is a distinct and separable part of the matter claimed. A mere statement of function certainly cannot be disclaimed nor is it the office of a disclaimer to vary the words of a claim to make that which is generic specific, or to make that which is specific generic, nor can there be found any case, we believe, in which it has been held that a disclaimer may be resorted to for the purpose of eliminating from a claim the intended and only practical use of the invention set forth or proposed or suggested by the patentee in the manner found in the present case.

Applying the principle laid down in Miller vs. Mfg. Co., 151 U. S. 186, the Court held in Palmer Pneumatic Tire Co. vs. Lozier, 90 Fed. 732, C. C. A., 6th Circuit, that where the characteristic and essential element of a patented article is made the subject of a later patent, the last and not the first patent is void and this the Court held even though the invention of such element preceded that of the completed article. In the course of its decision the Court, interpreting Miller vs. Mfg. Co., distinctly said that in that case

> "The second patent was held void upon the ground that the matter of the invention was included in the matter of the invention for which the former patent was granted. That decision shows that it is not necessary to the rule that the patents should be for co-extensive inventions, or that the subject-matter thereof should be technically the same. The rule rests upon the broad and obvious ground that, if the second patent is for an invention that was necessary to the use of the invention first patented, it cannot be sustained."

It hardly needs further discussion to demonstrate that this principle applies exactly to the present case for as a matter of fact de Ferranti has suggested no way in which the invention of the patent which he has caused to be issued could be practiced without using the invention claimed in his application and, as a matter of fact, it is clear that the subject-matter forming the invention of the application is covered by the invention patented by the patent. In principle it is clear that there is no essential difference between the case in which the characteristic and essential element of the previously patented article is made the subject of a later patent and one in which a characteristic and essential element of a patented process is made or proposed to be made the subject of a later patent and this remains true where the process as claimed in the first patent contains supposedly limiting words limiting it to the principal and only disclosed application of the process as in the present case.

Indeed the suggestion that the difficulty in which de Ferranti has placed himself by taking the patent may be cured by a disclaimer to be hereafter filed or a reissue to be hereafter made, amounts practically to suggesting that the Commissioner now arrive at his de-

cision upon the question before him by treating the record before him as a moot record and that the interference from now on be conducted as a moot proceeding.

Having issued a patent to Ferranti, the Commissioner is without power to continue this interference because his authority under the law (Section 4904) is confined solely to determining the question of priority of invention as between an applicant and a patentee or between two pending applications, and assuming that the interference was properly declared in the beginning, the interference is now, owing to the issuance of the patent to de Ferranti for the same invention as that forming the subject of the application, one between two patents. Both parties to the interference now have a patent for the same invention. Under such circumstances the Section 4918 providing for a procedure by suit in equity whenever there are interfering patents, becomes the only section applicable to the case.

The power of the Commissioner to institute the interference arose solely under Section 4904 and solely because de Ferranti was presumably an applicant for the same invention as that for which Harmatta had obtained a patent and it was necessary under the Statute, for the Commissioner to determine the question of priority of invention in order to determine whether a second patent should be issued to de Ferranti for the same invention. A patent to de Ferranti having, however, been issued by the Commissioner, he is without authority to further continue this proceeding, since Section 4904 is the only section under which he is authorized to conduct interference proceedings.

There can be no question that the patent issued to de Ferranti is for the same invention as that for which he sought a patent by his original application and the existence of the patent now issued to him constitutes as complete a bar under the law to the issuance of the patent upon the application as now contained in the interference as if said issued patent were a prior patent to another inventor. Furthermore and beyond any question, the invention as claimed in the application is necessary to the practice of the invention covered by the claims in the patent issued and this fact creates the insuperable objection to the continuance of the proceeding and the issuance of any further patent to de Ferranti upon his application claims that said patent would prolong the monopoly secured to him by the patent already issued.

IN CONCLUSION, FERRANTI HAS BY HIS PATENT OBTAINED A MONOPOLY FOR A PROCESS APPLIED TO TURBINE MANUFACTURE INCLUDING THE PROCESS DISCLOSED BY FIGS. 1 AND 2 THEREOF; HE NOW ATTEMPTS TO COVER, IN THE APPLICATION, THE PROCESS OF FIGS. 1 AND 2 APPLIED BROADLY TO ANY APPLICATIONS OR USES OF IT AND THEREBY, IF SUCCESSFUL IN THIS ATTEMPT, HE WOULD BE EXTENDED THE LIFE OF THE MONOPOLY GRANTED BY THE PATENT ALREADY ISSUED.

The above facts are also directly in line with the case of American Bell Telephone Co. vs. National Telephone Co. et al., 109 Fed. Rep. 976, in which the Court held that

> "The Berliner patent, No. 463,569, claim 2, for a telephone transmitter, was anticipated by patent No. 233,969, to the same patentee, issued on a division of the same application, and which, in claim 4, covers a system consisting of the same transmitter in connection with a receiver, but in which such transmitter performs the same function as with any other receiver, and is applied to its appropriate and intended use; a receiver of some kind being essential to its operation."

It is respectfully submitted and urged that this interference should be dissolved upon the law and the facts disclosed above either by transmission of the same to the Law Examiner for decision on the motion to dissolve or by order of the Commissioner acting under his supervisory powers.

Respectfully,
TOWNSEND & DECKER,
Attorneys for Harmatta

New York, Dec. 1, 1915.

FOR PAPER NO. 40 SEE INDEX.

EEG Letter No. 41.
Address only
The Commissioner of Patents,
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON.

December 3, 1915.

IN THE MATTER OF THE INTERFERENCE OF

DE FERRANTI

vs.

HARMATTA

INTERFERENCE No. 36,709.

APPEAL ON MOTION.

Sir:

You are hereby informed that the decision of the Commissioner on the above appeal is as follows:

The office has no jurisdiction to try out a question of priority where one of the parties is a patentee unless the other party, if successful, is entitled to a patent; for a proceeding by an applicant who is not entitled to a patent conducted with the aim of establishing priority of invention over the patentee would be a mere attack upon

the validity of the patent which must be made if at all, in defense of a suit for infringement.

If it should be established that de Ferranti may not obtain a patent upon the present application because the subject-matter thereof is the same as that of his patent, he could perhaps cover the same matter by a reissue application, but an interference can be declared only after the reissue application has been filed.

As to Harmatta's delay in bringing the motion, the fact that his patent was held invalid in the district court in Massachusetts, and that the appeal heard last April was not decided until October is regarded as a sufficient excuse. Had the lower court been sustained, there would be nothing to fight about.

The decision of the examiner of interferences is sustained

THOMAS EWING,
Commissioner.

December 2, 1915.
#36,709—2.

By direction of the Commissioner:

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Mail Room. No. 36,709 Paper No. 42.
Dec. 6, 1915.
U. S. Patent Office.
Docket Clerk.
Dec. 6, 1915.
U. S. Patent Office.

(Printed Letter Head Omitted)
New York, December 4th, 1915.

Hon. Commissioner of Patents,
Washington, D. C.
Sir:

IN THE MATTER OF THE INTERFERENCE OF

DE FERRANTI

vs.

HARMATTA

No. 36,709.

We have received a copy of the decision of the Commissioner of Patents dated December 3rd, 1915, on the appeal on Harmatta's

Motion to transmit a Motion to Dissolve. The whole text of this decision clearly seems to be that the Examiner of Interferences is reversed and in fact the attorneys so understood the Commissioner to state at the hearing, although the copy of the decision we have concludes with the expression:

"The decision of the Examiner of Interferences is sustained."

We think this is an obvious error and respectfully request information.

Very respectfully,

CFT/IL. TOWNSEND & DECKER.

FOR PAPER NO. 43 SEE INDEX.

Address only Letter No. 44.
The Commissioner of Patents,
Washington, D. C. EEG

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

December 6, 1915.

IN THE MATTER OF THE INTERFERENCE OF

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

APPEAL ON MOTION.

Sir:

You are hereby informed that the following is a copy of a supplemental decision of the Commissioner in the above entitled case:

It has been called to my attention that in the opinion of December 2, the Examiner of Interferences is sustained, whereas it was intended that he should be reversed.

The opinion is accordingly corrected and the Examiner of Interferences is reversed.

THOMAS EWING,
Commissioner.

December 6, 1915.

By direction of the Commissioner:

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,

590 Defendant's Exhibit No. 33.

Address only E-EEG 36,709. Letter No. 45.
The Commissioner of Patents,
Washington, D. C.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

December 7, 1915.

IN THE MATTER OF THE INTERFERENCE OF

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Sir:

You are hereby informed that a hearing on the motion to dissolve filed by Harmatta has been fixed before the Law Examiner, in Room 273, for Wednesday, January 5, 1916, at 10 A. M.

Very respectfully,
W. F. WOOLARD,
Chief Clerk.
F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Docket Clerk. Intf. No. 36,709. Paper No. 46.
Dec. 8, 1915.
U. S. Patent Office.

District of Columbia, ss:

Bessie I. Bishop, being duly sworn, deposes and says that she is a Clerk in the employ of Spear, Middleton, Donaldson & Spear, and that on the 7th day of December, 1915, she placed a copy of the attached motion for a rehearing in an envelope addressed to Townsend & Decker, 149 Broadway, New York, and that she sent the same by registered mail, as per the registered receipt hereto attached.

BESSIE I. BISHOP.

Sworn to and subscribed before me this 8th day of December, 1915.

(Seal) BENNETT S. JONES,
Notary Public.

IN THE UNITED STATES PATENT OFFICE.

Denied Dec. 29, 1915.
THOMAS EWING,
Commissioner of Patents.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

TO THE COMMISSIONER OF PATENTS.

Now comes the party De Ferranti by his Attorneys and petitions your Honor for a rehearing on the appeal of the party Harmatta from decision of the Primary Examiner refusing to transmit the motion to dissolve.

The grounds on which the rehearing is asked are as follows:

First, your Honor failed to take note of the fact that claims for substantially the same invention which forms the subject matter of the counts of the issue in the present interference, were twice made in the parent applicant, upon which patent No. 1,148,221 of De Ferranti was issued, and said claims were twice rejected by the Examiner and required to be cancelled as being for a separate invention from the other claims. Such claims were first made by amendment J[1] in amendment of December 8th, 1909 and again presented as claims 8, 9 and 10 of Paper No. 27, dated December 6th, 1910.

The Office having therefore placed itself on record as holding that the invention included in the counts of the present interference is for a different invention from that contained in the claims of the patent of De Ferranti, and this question being of no consequence in respect to priority of invention, said De Ferranti should not *at this stage of the proceedings* have placed upon him the burden of proving that the Office was right in its original holding.

The second ground is that the Harmatta patent, having been pending during the time when applicant was presenting claims for the invention included in the counts of the issue, in an application which afforded basis for such claims, the issue of the patent to Harmatta was clearly by inadvertence on the part of the Office and under the decisions, Harmatta is not entitled to derive any advantage from the mistake by the Patent Office. In Watson vs. Thomas, 106 O. G. 1776, it was held that where the patent was inadvertently granted "the two parties in the interference proceeding are to be treated as applicants with copending applications," citing Wurtz vs.

Harrington, 79 O. G. 337. See also Shaffer vs. Dolan, 108 O. G. 2146; Furman vs. Dean, 114 O. G. 1552; Paul vs. Hess, 115 O. G. 251; and Cutler vs. Leonard, 136 O. G. 438.

Third, it was believed your Honor, in considering the delay in bringing the motion, failed to consider the fact that the interference had progressed to a stage where De Ferranti had introduced all of his evidence which ineluctibly carried his date of invention back of Harmatta's date of filing.

Therefore, a rehearing of the matter and a reconsideration of your Honor's decision reversing the action of the Examiner of Interferences is respectfully requested.

Respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

RECEIPT FOR REGISTERED MAIL.

No. 190593 ,
Washington (Sta G) D. C.
Registered, Dec. 7, 1915.
1 class postage prepaid. Postmaster, per H.

Docket Clerk. 36,709—47.
Dec. 15, 1915.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

Please permit Messrs. Havell & Havell of Washington, D. C., to inspect the file of the above interference.

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, December 14th, 1915.

FOR PAPER NO. 48 SEE INDEX.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

December 30, 1915.

IN THE MATTER OF THE INTERFERENCE OF

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

PETITION BY DE FERRANTI FOR REHEARING.

Sir:

You are hereby informed that the decision of the Commissioner on the above petition is as follows:

DENIED
DEC. 29, 1915

THOMAS EWING,
Commissioner of Patents.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

S. Z. de Ferranti, F.
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Docket Clerk. 36,709—50.
Jan. 5, 1916.
U. S. Patent Office.

UNITED STATES PATENT OFFICE,

BEFORE THE LAW EXAMINER.

In re Interference:

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

BRIEF FOR HARMATTA.

This interference now comes before your Honor for decision on the merits of a motion to dissolve brought by Harmatta and duly

transmitted to your Honor after appeal to the Honorable Commissioner of Patents in person.

Harmatta, the senior party to the interference, is a patentee, and de Ferranti, the junior party, is an applicant, he having copied certain broad claims from the Harmatta patent No. 1,046,066 involved in this interference for the purpose of contesting priority thereof with Harmatta. Harmatta's patent involved in this interference was issued on December 3rd 1912 on an application filed December 3rd 1903. De Ferranti's application involved in this interference was not filed until December 29th 1911 as an alleged division of an earlier application of his filed May 14th 1904. The claims of the interference are for a process of electric welding now known broadly as "spot welding." On July 27 1915 de Ferranti, the junior party to this interference, had issued to him a United States patent No. 1,148,221 for Process for Electrically Welding Turbine Blades, this being the patent issued on the original application of which Ferranti's application directly involved in this interference is alleged to be a division. Figures 1 and 2 of this patent are the same as the figures of the Ferranti application in the interference. The claims of the patent are for a process or method based on the disclosures of Figures 1 and 2 which are also the subject of the pending application.

The substance of the motion now brought by Harmatta to dissolve the interference is that the issuing of a patent to de Ferranti for the invention claimed in his application declared to be in interference with Harmatta would effect a double patenting of the invention already patented to de Ferranti by his Letters Patent No. 1,148,221.

In his issued patent No. 1,148,221 Ferranti describes and claims a certain method of electrically welding turbine blades to their carrying element. In his application involved in this interference he claims the method of electric welding which is based on the same identical process as that claimed in the patent, the wording of the claims of the application, however, being different than the wording of the claims of the patent although both are drawn to processes. The claims of the application are broader in scope than those of the patent and if granted in a patent to Ferranti with a construction broad enough to cover the process he discloses, would be to grant to Ferranti an extension of the monopoly previously granted to him by his issued patent No. 1,148,221.

The contention is absolutely correct that in his patent No. 1,148,221 referred to in the motion, Ferranti claims his same substantial method or process that he claims in his application in interference and that there is no difference in the two methods to be inferred merely because in the patent he defines the process by reference to the result of welding onto the projections. In other words, in the application in interference the invention claimed is a method or process of welding done by welding to projections while in the patent the method or process is identified by the necessary physical ac-

tion which takes place in the operation of welding to the projections.

IN REACHING A SATISFACTORY CONCLUSION IN THIS MATTER IT MUST BE BORNE IN MIND THAT THE DRAWINGS AND SPECIFICATIONS OF THE APPLICATION AND PATENT ARE EXACTLY ALIKE; THAT THE ONE DESCRIBES NO OTHER DIFFERENT OPERATION THAN THAT DESCRIBED AND SET FORTH IN THE OTHER; THAT THE TWO ARE BASED UPON THE SAME IDENTICAL ORIGINAL APPLICATION; THAT THEY DO NOT BEAR THE RELATION TO ONE ANOTHER OF INVENTION AND IMPROVEMENT; THAT THE CLAIMS, THOUGH IN DIFFERENT WORDS, REFER TO EXACTLY THE SAME PRACTICAL OPERATION AND ARE FOUNDED UPON THE INVENTION AS DISCLOSED IN THE ORIGINAL APPLICATION AND THAT THE PATENT CLAIM DIFFERS FROM THE APPLICATION CLAIM ONLY IN DESCRIBING A FUNCTION OF THE OPERATION OMITTED FROM THE APPLICATION CLAIM. Assuming that it were true, which does not appear to be the case, that one might perhaps modify the operation as claimed in the application so that the normal equalization of the heat capacity would not take place, it nevertheless remains true that no such suggestion or modification of operation is in any manner suggested in either specification or in the drawings of either case. In other words, *the process or operation patented by the patent is the same as that which the applicant seeks to patent by the application.*

INVENTIONS OF PATENT AND APPLICATION INSEPARABLE.

It seems to us clear that the matter sought to be covered by the patent is inseparably involved in the matter sought to be covered by the application; that the patent and application are in fact for the same substantial invention and that the circumstances of this case are exactly parallel to the leading cases of Thompson-Houston Electric Co. vs. Housic Railway Co., 82 Fed. 461, Circuit Court of Appeals, 2nd Circuit, Thomson-Houston Electric Co. vs. Jeffrey Mg. Co., 101 Fed. 121, C. C. A., 6th Circuit, which have been followed in numerous other cases and which were founded upon decisions of the Supreme Court of the United States rendered on substantially the same state of facts in the case of Miller vs. Eagle Co., 151 U. S. 186. We also cite:

Plummer vs. Sargent, 120 U. S. 442;
Lock Co. vs. Mosler, 127 U. S. 354;
McClain vs. Ortmeyer, 141 U. S. 419;
Palmer Pneumatic Tire Co. vs. Lozier, 90 Fed. Rep. 732;
Thomson-Houston Co. vs. Black River Co., 124 Fed. Rep. 501;
Malby Electric vs. Thomson-Houston, 148 Fed. Rep. 845;
Thomson-Houston vs. Western Electric, 158 Fed. Rep 813.

Under the authority of these cases the Patent Office is confronted *with the condition that de Ferranti has now obtained a patent for the actual invention for which he is seeking a patent by the application in interference and that said patent must stand as an effectual bar to the grant of a patent upon the application.* In principle the circumstances and conditions now confronting the Patent Office of the state of facts arising from the act of the applicant in taking the patent are in no wise different than they would be if it should be discovered that the invention had been patented to some other person or even to the applicant himself by a previous patent granted prior to any date of invention appearing in this record either by the application on record or by allegation of the preliminary statement and that both parties now having obtained a patent it is the plain duty of the Patent Office to terminate this interference, leaving the party Ferranti to take such step or steps as he may be advised are necessary in order to protect his rights.

Some suggestion has been made that the objection that the invention covered by the patent and that covered by the application are inseparably involved may be avoided on some theory that the patent is for a method of attaching turbine blades and that in the application claim no reference is made to attaching turbine blades. In our view this suggestion has no merit and does not remove the difficulty. The argument seems to be simply that a lawful line of separation of patent and application is found in the fact that the patent claims one use or application of the process and that the application claim is not limited in terms to that use. A mere statement of the argument seems to us to carry its own confutation. We never yet heard of a case in which a Court has been asked to find a line of division between two patents or claims, so that both patents may be declared valid, upon the argument that one calls for or specifies the only use or application of the invention that is set forth by the inventor while the claim of the other is distinguishable only from the first as a claim of invention in failing to state that use or application, thereby covering all uses including the one specified. In fact sufficient ground for the rejection of this argument is found in the repeated refusals of the Patent Office and the Courts to recognize the validity of two patents founded upon the same description and specification where one patent claims the invention generically and the other claims the same and no other invention specifically. Numerous cases on this proposition might be cited but even apart from that, it is self-evident that the inventions do not become different merely because the patentee recites in one the principal and practically the only proposed use of his invention, while in the other he claims his invention without particular reference to that principal and useful application of the same.

Applying the principle laid down in Miller vs. Eagle Co., 151 U. S. 186, the Court held in Palmer Pneumatic Tire Co. vs. Lozier, 90 Fed. 732, C. C. A., 6th Circuit, that where the characteristic and essential element of a patented article is made the subject of a later patent, the last and not the first patent is void and this the Court

held even though the invention of such element preceded that of the completed article. In the course of its decision the Court, interpreting Miller vs. Eagle Co., distinctly said that in that case

> "The second patent was held void upon the ground that the matter of the invention was included in the matter of the invention for which the former patent was granted. That decision shows that it is not necessary to the rule that the patents should be for co-extensive inventions, or that the subject-matter thereof should be technically the same. The rule rests upon the broad and obvious ground that, if the second patent is for an invention that was necessary to the use of the invention first patented, it cannot be sustained."

It hardly needs further discussion to demonstrate that this principle applies exactly to the present case, for as a matter of fact de Ferranti has suggested no way in which the invention of the patent which he has caused to be issued could be practiced without using the invention claimed in his application and, as a matter of fact, it is clear that the subject-matter forming the invention of the application is covered by the invention patented by the patent. In principle it is clear that there is no essential difference between the case in which the characteristic and essential element of the previously patented article is made the subject of a later patent and one in which a characteristic and essential element of a patented process is made or proposed to be made the subject of a later patent and this remains true where the process as claimed in the first patent contains supposedly limiting words limiting it to the principal and only disclosed application of the process as in the present case.

The state of facts existing in Ferranti's patent and application leads to the query: HOW CAN TWO *DIFFERENT* INVENTIONS BE PREDICATED UPON OR EVEN INCLUDE THE SAME PROCESS? The mere addition to the claim of unpatentable features or features old in the art or features necessary to the carrying out of the process does not make it a different invention.

THE PROCESS OF FIGS. 1 AND 2 OF THE PATENT, IT MUST BE ADMITTED, IS COVERED BY THE CLAIMS IN THE PATENT; therefore the process claims of the application must necessarily be for the same invention, they being predicated on the process disclosed by Figs. 1 and 2 even though they may be expressed in a different guise and in some cases with the addition of unpatentable features.

As was held in Ex parte Woodward, 1890 C. D. 169, separate patents cannot be allowed for the same invention under different guises or as different mental figments.

Applications are not severable excepting upon structural (that is, physical) lines which actually divide the machine (process) into separable parts. By taking out a patent for the device arranged to operate in a specific manner the applicant abandoned to the public

the more general claims which might have been predicated upon the same combination of parts. See Fassett vs. Ewart Mfg. Co., 58 Fed. 360.

The claims of the Ferranti application are based upon the same original application as the patent and are predicated on the same inventive act. The case is not that of an application for a broad invention followed by an application for a subsequently invented improvement and therefore to issue a patent to Ferranti on his present application would result in double patenting following the ruling laid down in Otis Elevator Co. vs. Portland Co., 127 Fed. 557. See also on this point Morse Chain Co. vs. Link Belt Co., 164 Fed. 331.

Having issued a patent to Ferranti, the Commissioner is without power to continue this interference because his authority under the law (Section 4904) is confined solely to determining the question of priority of invention as between an applicant and a patentee or between two pending applications, and assuming that the interference was properly declared in the beginning, the interference is now, owing to the issuance of the patent to de Ferranti for the same invention as that forming the subject of the application, one between two patents. Both parties to the interference now have a patent for the same invention. Under such circumstances the Section 4918 providing for a procedure by suit in equity whenever there are interfering patents, becomes the only section applicable to the case.

The power of the Commissioner to institute the interference arose solely under Section 4904 and solely because de Ferranti was presumably an applicant for the same invention as that for which Harmatta had obtained a patent and it was necessary, under the Statute, for the Commissioner to determine the question of priority of invention in order to determine whether a second patent should be issued to de Ferranti for the same invention. A patent to de Ferranti having, however, been issued by the Commissioner, he is without authority to further continue this proceeding, since Section 4904 is the only section under which he is authorized to conduct interference proceedings.

THE SUBJECT-MATTER OF THE APPLICATION (THE PROCESS OF FIGS. 1 AND 2) IS COMPLETELY EMBODIED IN THE CLAIMS OF THE PATENT.

There can be no question that the patent issued to de Ferranti is for the same invention as that for which he sought a patent by his original application and the existence of the patent now issued to him constitutes as complete a bar under the law to the issuance of the patent upon the application as now contained in the interference as if said issued patent were a prior patent to another inventor. Furthermore and beyond any question, the invention as claimed in the application is necessary to the practice of the invention covered by the claims in the patent issued and this fact creates the insuperable objection to the continuance of the proceeding and the issuance of any further patent to de Ferranti upon his applica-

tion claims that said patent would prolong the monopoly secured to him by the patent already issued.

The above facts are also directly in line with the case of American Bell Telephone Co. vs. National Telephone Co., et al., 109 Fed. Rep. 976, in which the Court held that

> "The Berliner patent, No. 463,569, claim 2, for a telephone transmitter, was anticipated by patent No. 233,969, to the same patentee, issued on a division of the same application, and which, in claim 4, covers a system consisting of the same transmitter in connection with a receiver, but in which such transmitter performs the same function as with any other receiver, and is applied to its appropriate and intended use; a receiver of some kind being essential to its operation."

SPECIFIC AND BROAD CLAIMS.

In his patent Ferranti has specified claims to the process as used for a specific purpose, while in the application the claims are broad to the process for any uses.

Where a patent has been issued for specific devices, a second patent with generic claims covering the specific devices would be void for double patenting. Gold vs. Gold, 187 Fed. 273.

A patent with specific narrow claims followed by a second patent with claims of broad or generic scope based on an improvement is double patenting. Union Typewriter vs. Smith & Bros., 173 Fed. 288.

Two patents may be for the same invention although the earlier claims only a specific machine and the later claims broadly a genus which includes the earlier specific machine and others as well. Otis Elevator Co. vs. Portland Co., 127 Fed. 557.

There is no line of division based merely on scope or breadth of claim. Porter vs. Louden, 73 O. G. 1551 (Court of Appeals of the District of Columbia).

No lawful decision based upon a mere distinction of scope of claims based upon the same subject-matter or entity. Ex parte Holt, 1884 C. D. 43 is a clear statement of the case. See also Ex parte Mullen, 1890 C. D. 9 in which the cases in which division is permissible are clearly expounded. Also, Ex parte Neiswanger, 1890 C. D. 37.

RULE 106.

> "When a part only of an application is involved in an interference, the applicant may withdraw from his application the subject-matter adjudged not to interfere, and file a new application therefor, or he may file a divisional application for the subject-matter involved, if the invention can be legitimately divided: PROVIDED, That no claim shall be made in either application broad enough to include matter claimed in the other."

Clearly Ferranti's position is in violation of the provisions of this rule of the Patent Office in that the claims of both his patent and his application are broad enough to cover the process claimed in both cases and this must necessarily be so as the claims of both cases are drawn to cover the same identical process of welding.

IN ORDER TO RECEIVE TWO PATENTS FERRANTI MUST HAVE TWO INVENTIONS AND HOW CAN HE HAVE TWO INVENTIONS WHEN HE HAS INVENTED ONLY ONE PROCESS?

REISSUE AND DISCLAIMER.

As it has been argued that the difficulty of double patenting might be cleared up by either of the above remedies, to wit,—reissue or disclaimer, it might be well to briefly allude to them although they are entirely aside from the merits of the motion. The question of reissue has been disposed of by the Commissioner in his decision dated December 3rd, 1915. This ruling of the Commissioner applies equally as well to a proposed disclaimer. What kind of a disclaimer would be applicable to these circumstances and whether or not the case is one for disclaimer under the law, or whether in fact a disclaimer in one of two patents conflicting in being for the same invention would operate to make the other valid, and whether or not any actual disclaimer has been filed or will be filed, are matters upon which the Patent Office is not called upon to pass at this stage of the case or under the status of the record as now presented. What the applicant may choose to do lies wholly within his own mind and is subject wholly to future action on his behalf.

It is self-evident that in any event the present is not a case for resort to the use of a disclaimer for the reason that the matter of the patent and application are inseparable as patentable matters and disclaimers are only permissible under the Statute and the patent law in cases where the matter disclaimed is a distinct and separable part of the matter claimed. A mere statement of function certainly cannot be disclaimed nor is it the office of a disclaimer to vary the words of a claim to make that which is generic specific, or to make that which is specific generic, nor can there be found any case, we believe, in which it has been held that a disclaimer may be resorted to for the purpose of eliminating from a claim the intended and only practical use of the invention set forth or proposed or suggested by the patentee in the manner found in the present case.

IN CONCLUSION, FERRANTI HAS BY HIS PATENT OBTAINED A MONOPOLY FOR A PROCESS APPLIED TO TURBINE MANUFACTURE INCLUDING THE PROCESS DISCLOSED BY FIGS. 1 AND 2 THEREOF; HE NOW AT-

TEMPTS TO COVER, IN THE APPLICATION, THE PROCESS OF FIGS. 1 AND 2 APPLIED BROADLY TO ANY APPLICATIONS OR USES OF IT AND THEREBY, IF SUCCESSFUL IN THIS ATTEMPT, HE WOULD BE EXTENDING THE LIFE OF THE MONOPOLY GRANTED BY THE PATENT ALREADY ISSUED AND WOULD BE RECEIVING TWO PATENTS FOR THE SAME INVENTION.

It is respectfully submitted and urged that this interference should be dissolved upon the law and the facts disclosed above.

Respectfully,

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, January 4th 1916.

36,709—50
MCV

Hearing:
Jan. 5, 1916.

IN THE UNITED STATES PATENT OFFICE.

PATENT INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

MOTION FOR DISSOLUTION.

ELECTRIC WELDING.

Application of Sebastian Ziani de Ferranti filed Dec. 29, 1911, Ser. No. 668,464, division of application No. 208,034, filed May 14, 1904.

Patent granted Johann Harmatta Dec. 3, 1912, No. 1,046,066, on application filed Dec. 3, 1903, No. 183,677.

Messrs. Spear, Middleton, Donaldson & Spear for de Ferranti.
Messrs. Townsend & Decker for Harmatta.

The party Harmatta moves for a dissolution of the interference on the ground that the grant to the party de Ferranti on July 27, 1915, of patent No. 1,148,221 for Process of Electrically Welding Turbine Blades constitutes a bar to the grant to de Ferranti of a patent containing the claims which constitute the issue of this interference. In other words, it is contended by Harmatta that if a patent were granted to de Ferranti containing the claims of the interference issue is would be double patenting of the invention covered by de Ferranti's patent No. 1,148,221.

The interference issue is:

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce as isolated spot or spots of union, leaving distinct or well defined areas in which the pieces are not welded together.

The claims of the de Ferranti patent are:

1. The method of attaching turbine blades to their carrier of relatively great mass which consists in adjusting the heat capacity of the localized area of the carrier at the point of attachment by partially isolating these areas from the remainder of the carrier so that a welding temperature may be reached notwithstanding the cooling effect of the mass of the carrier, and passing a uniform electric heating current directly through the carrier and by way of the clamps through the blades to weld the blades in succession to the carrier, substantially as described.

2. The method of attaching turbine blades to their rotor carrying elements one by one, consisting in equalizing the heat capacity of the welding parts by limiting the conducting areas of the carrier at the points of blade attachment symmetrically in relation to the axis of rotation of the rotor, and inclosing the blades between clamps so that on heating locally by a uniform electric current, the blades and carrier rise to approximately the same temperature on welding the blades to the carrier so prepared, substantially as described.

3. Process for the attachment of turbine blades to their carriers consisting in partially isolating those portions of the carrier in the neighborhood of the points of attachment of the blades, to limit

the cross-sectional area available for the conduction of heat therefrom; artificially increasing the volume of the blades by contacting them with metal masses of high heat conductive capacity and finally welding together the carriers and blades so prepared.

4. Process for the attachment of turbine blades to their carriers, consisting in forming circumferential grooves with intervening rings of metal around the carrier thereby limiting the cross sectional area available for the conduction of heat from the point of attachment so that on heating locally, said blade and said carrier rise to approximately the same temperature and welding each blade to a plurality of said rings, as set forth.

5. The method herein described of constructing a turbine wheel, ring or drum, the same consisting first in forming said wheel symmetrically in relation to its center of rotation with the parts next to the welding points reduced to properly conform to the volume of the blades and electrically welding said blades at the said points whereby the symmetry of the wheel is maintained.

The invention forming the bases of this interference is a process of electric welding, the characteristic feature of which is the welding together of two pieces of metal at spots only of the contacting surfaces by heat and pressure localized at the spots at which the welding is to take place. There is no limitation in any of the counts as to the instrumentalities employed in carrying out the process, neither is there any limitation in the counts as to the character of the pieces of metal to be welded together. In the drawing of the de Ferranti application involved in interference there are two figures, Figure 1 being described as showing a turbine bladed element, having the blades welded thereto and Figure 2 as a part side elevation of the bladed element shown in Figure 1. There is no disclosure in either of the figures of the means for producing pressure or of the means for electrically heating the pieces of metal to be electrically spot welded together. The specification of the de Ferranti application is equally silent as to the specific steps or means employed in subjecting the parts to be welded together to heat and pressure. After describing the manner in which a series of projections are formed on the surface of the wheel to which the blades are to be welded, the specification of the application proceeds to state:

> The blade *d*, is welded to certain of the projections, *f*, by passing across the points of contact of the opposing surfaces, an electric current in a known manner.

The application involved in interference is a division of the de Ferranti application which matured into patent No. 1,148,221. The drawing of the patent contains seventeen figures including the figures of the application drawing. The drawing of the patent illustrates various modifications directed to securing proper welding temperatures of the turbine wheel and blades and also shows an

apparatus by which the steps of the process claimed may be carried out.

The claims of the de Ferranti patent each contain limitations which are not readable upon either drawing or specification of the de Ferranti application. Thus claim 1 calls for "passing a uniform electric heating current directly through the carrier and by way of the clamps through the blades to weld the blades in succession to the carrier." There is no disclosure whatever in the de Ferranti application of clamps for the blades to be welded to the carreir.

Claim 2 of the patent specifies, "enclosing the blades between clamps so that on heating locally by a uniform electric current, the blades and carrier rise to approximately the same temperature on welding the blades to the carrier so prepared." What was said with respect to the use of clamps in connection with claim 1 also applies to claim 2.

Claim 3 states, "artificially increasing the volume of the blades by contacting them with metal masses of high heat conductive capacity." This refers to the special character of the clamps and is described in lines 38 to 42, inclusive, page 2 of the printed specification. As has heretofore been stated, there are no clamps of any kind disclosed in the application involved in interference.

Claim 4 of the patent is limited to a special form of carrier to which the turbine blades are to be attached, i. e., one having circumferential grooves with intervening rings of metal. No such carrier is disclosed in the de Ferranti application.

Claim 5 of the patent calls for a method of constructing a turbine wheel which includes among other things, "forming the wheel symmetrically in relation to its center of rotation * * * whereby the symmetry of the wheel is maintained." There is no disclosure in the de Ferranti application of any step such as that noted with respect to claim 5.

It seems clear to the law examiner that not only are the claims of the de Ferranti patent limited to matter not disclosed in the application but the claims of the application involved in interference recite methods which can be carried out without employing the steps of the method claims of the patent. This is evidenced not only by the disclosure of the de Ferranti application but by the disclosure of the Harmatta patent which fails to respond to the limitations in the de Ferranti patent claims to which reference has been made above.

The brief filed by Harmatta does not discuss the specific limitations in the claims of the de Ferranti patent to which reference has been made herein but states generally that the inclusion of unpatentable limitations in the claims of a patent will not avoid the bar of double patenting. It need only be said on this point that nothing has been presented here to show that the limitations in the claims of the patent, to which reference has been made, are immaterial or unpatentable, even if the law examiner had authority to pass on that question.

Considerable weight is attached by the moving party in his brief to the fact that Figures 1 and 2 of the de Ferranti patent correspond to the Figures of the application drawing. The figures in question, taken either alone or in connection with the description of the figures in application or patent, do not support the language or the substance of the claims of the patent.

It does not appear to be material to the question of double patenting that the claims involved in interference are broader than the claims of the de Ferranti patent and that such broader claims are contained in a later filed divisional application. Welsbach Light Co. v. Cohn, Fed. Rep. 181, 123.

The motion for dissolution is denied.

E. S. HENRY,
Law Examiner.

January 19, 1916.

EEG 36,709. Letter No. 51.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON.

January 20, 1916.

IN THE MATTER OF THE INTERFERENCE OF

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE NO. 36,709.

MOTION FOR DISSOLUTION.

SIR:

Please find enclosed herewith a copy of a decision of the Law Examiner in the above entitled case.

Very respectfully,

W. F. WOOLWARD,
Chief Clerk.

F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York City.

Paper No. 53.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

IAW 2—224

January 22, 1916.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The law examiner having denied Harmatta's motion for dissolution filed October 28, 1915, proceedings herein are resumed, and the times for taking testimony and for final hearing are reset as follows:

Testimony in chief of De Ferranti to close March 22, 1916.
Testimony of Harmatta to close April 22, 1916.
Rebuttal testimony of De Ferranti to close May 8, 1916.
Final hearing: July 11, 1916, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Jan. 26, 1916.
U. S. Patent Office.

Intf. No. 36709, Paper No. 54.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

PETITION TO THE HONORABLE COMMISSIONER OF PATENTS IN PERSON.

Now comes Johann Harmatta, by his attorneys, and respectfully petitions your Honor to exercise your supervisory powers and review the decision of the Law Examiner rendered January 19th 1916, denying your petitioner's motion for dissolution of this interference. The motion for dissolution, in brief, is that de Ferranti has no right to make the interference claims for the reason that to issue such claims to him in his application involved in the interference would be double patenting of the invention covered by de Ferranti's prior patent No. 1,148,221.

It is contended that the Law Examiner is clearly in error in his conclusion as to what constitutes double patenting under the law as laid down in the numerous authorities cited by your petitioner in his brief already filed.

The Law Examiner has not finally determined the question by his decision for the reason that the decision turns on the point that he has no information that the limitations in the claims of the patent are immaterial or unpatentable. This was discussed and urged in the oral argument and the Law Examiner should take judicial notice of knowledge which is in the possession of the Examiners of the Patent Office; in other words we ask for a review of the Law Examiner's decision upon the ground that in refusing to take note of the state of the art in respect to elementary details of processes of electric welding as known to the officials of the Patent Office and as urged orally at the hearing, his decision is not and cannot be fully decisive of the question raised by Harmatta's motion.

Further, the Law Examiner by his decision has completely overlooked the provisions of Rule 106 which was raised in your petitioner's brief.

tive decision as to the right of a party to make the claims or as to the patentability of claims. I do not find that the circumstances of this case justify the exercise of my supervisory authority to review the decision of the law examiner.

The petition is denied.

THOMAS EWING,
Commissioner.

January 28, 1916.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.
Johann Harmatta,
c/o Townsend & Decker,
149 Broadway,
New York City.

Docket Clerk. 36,709—57.
Apr. 15, 1916.
U. S. Patent Office. Testimony for

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

(batch 1)

HARMATTA.

New York, N. Y., March 20th, 1916.

Messrs. Spear, Middleton, Donaldson & Spear,
Victor Building,
Washington, D. C.

GENTLEMEN:

PLEASE TAKE NOTICE that on Tuesday, March 28th, 1916, beginning at 11 a. m., at the office of Townsend & Decker, 149

Broadway, New York, before George E. Brown, Notary Public in and for the County of New York or some other duly authorized officer, the party Harmatta will proceed to take the depositions of the following witnesses in his belief in the above interference:

Hermann Lemp of Erie, Pa.;
James H. Gravell of Philadelphia, Pa.;

and possibly others. The examination will continue from time to time until completed and you are invited to attend and cross-examine.

TOWNSEND & DECKER,
Attorneys for Harmatta.

Due service of the above notice admitted this 22" day of March 1916.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

New York, N. Y., March 28th, 1916.

Testimony taken on behalf of Harmatta pursuant to the annexed notice at the office of Townsend & Decker, 149 Broadway, beginning at 11 A. M., March 28, 1916.

Present: MR. H. C. TOWNSEND for Harmatta.
MR. WILLIAM F. HALL for de Ferranti.

HERMANN LEMP, being duly sworn, deposes and says as follows in answers to interrogations by MR. TOWNSEND:

Question 1. What is your name, age, residence and occupation?

Answer. Hermann Lemp, 53, Engineer of the Erie Works General Electric Company, Erie, Pa.

Q. 2. Have you had any practical knowledge and experience in the art of electric welding?

A. Yes, I was chief engineer of the Thomson Electric Welding Company for seven years.

Q. 3. Will you please state fully the nature and extent of your knowledge and experience in the art?

A. From 1888 until 1895 I was in full charge of the Commercial development of electric welding apparatus and accessories for the utilization of the Thomson Electric Welding process and therefore thoroughly acquainted with the early history and practices followed in the art of welding and the means employed for applying them in the art.

Q. 4. Since the date last mentioned have you kept yourself informed in a general way as to the progress of that art?

A. I naturally have in a general way but my time having been fully occupied with my own work, I have not followed it in detail.

Q. 5. I call your attention to a copy of the provisional specification of de Ferranti filed in connection with proceedings for obtaining the British patent No. 11921 of 1903 unaccompanied by drawings, a certified copy of which provisional specification is on file in the United States Patent Office as a part of a stipulation entered into between the parties in this interference on or about the 14th day of May 1915 and acknowledged by the Office Letter dated May 18th 1915 and will ask you whether you have read and considered the description forming that provisional specification wholly apart from the complete specification and any drawings accompanying the latter, and whether you believe that you understand that description in the provisional specification so far as it goes?

A. Yes, I have.

Q. 6. Will you please state from the standpoint of one having a practical knowledge and experience of the art of electric welding as it existed at the date of filing of that provisional description in the British Patent Office, to wit: May 25th 1903, your understanding of the invention purporting to be described in that specification and as desclosed thereby alone and apart from the complete specification and any drawings accompanying the latter?

(By Mr. Hall: Objected to as incompetent and inadmissible as an effort to adduce expert testimony regarding the disclosure in the provisional specification without leave of the Examiner of Interferences.)

A. The provisional specification describes to me a method of shaping or modifying the surface of a mass greater than that to which a smaller mass is to be welded in such a way as to produce equal heating of the two parts to be welded and which method is so entirely the usual one followed by us in everyday welding operations, as thoroughly explained in the literature of the early days of the art, that it does not disclose to me anything novel. It is merely the application of wellknown principles to a specific case numbers of which have been brought to our attention times and times again and were met in similar matters as described in the provisional specification of de Ferranti. When two pieces of metal had to be welded together by the Thomson process one of which was of a larger

section than the other, the usual procedure was and still is to decrease the section of the larger piece at the point where it was to be welded to the smaller piece either by cutting away part of the metal or by forging or forming projecting tits of a section as near as possible to the smaller part to be welded thereto. Sometimes these projections were cast on, in other cases they were produced by removing metal just as the special condition of the work would demand it. This method of procedure was always necessary for the purpose of creating an equal production of heat on both parts to be welded by making the resistance of the metal through which the heating current flows as nearly as possible alike and conversely of preventing the carrying off of heat from the abutments to be welded in as equal a manner as possible.

(By Mr. Hall: In addition to the objection made to the question all of the answer commencing with the words "and which method," line 5, is objected to as stating a mere conclusion, as secondary evidence and as irrelevant, immaterial and inadmissible in respect to the practice followed in the Thomson process since it endeavors to introduce a question of the practice which has been followed in the art. This is immaterial to the issues in this case, and cannot be introduced in this manner or without special leave of the Examiner of Interferences or Commissioner of Patents.)

Q. 7. Will you please mention some of the early literature that you have in mind as referring to the shaping or modifying the surface, as mentioned by you, and compare what is set out in the instances you may refer to with what you understand to be the manners of shaping or modifying the surface to which de Ferranti refers in the provisional description?

(By Mr. Hall: The objections made to the last answer and question are repeated. The question is also objected to as calling for incompetent and inadmissible evidence since it seeks to bring into the case the prior art.)

A. I refer to the original Thomson patent No. 347,141 in which, in Fig. 8, it is shown how the blade of a knife is chamfered to meet the diameter of the handle. Again, to one of the earliest publications by Prof. Elihu Thomson on the art of electric welding, as given in the Electrical World of December 25th 1886. I refer with particular attention to paragraph on page 399 which I herewith quote:

"When the pieces are of the same metal and of the same size or section, the junction is made by placing the ends of the pieces abutted midway between the clamps before applying the pressure to force them together and the current to weld them

But when they are of different metals or of different sections, the abutment or meeting point is placed nearer the clamp carrying the most resisting metal; or, the piece of smaller section, or the metal most readily fused, as the case may be, is so placed so as to project least, for the purpose of favoring the accumulation of heat in the other piece.

"In joining pieces of different diameters the end of the large piece is reduced to the size of the smaller before attempting to effect the weld."

I also refer to patent 396,010 of Jan. 8th 1889, Fig. 9, described on second page 2:

"This knob or protuberance may be utilized in a variety of ways—as, for example, a lateral bar may be welded to the knob by my electric-welding process, which forms the subject of prior application; or, the lateral projections b, Fig. 10, having been formed at a distance from the end of a bar, the end may be bent to shape, as shown in Fig. 11, and finally welded electrically as a ring, as shown in Fig. 12, thus forming a loop on the end of the bar."

Also to patent No. 434,530, of August 19th, 1890, Fig. 10; and patent 487,302, December 6th, 1892, Fig. 4, described on second page lines 90 to 110. Also to article in the "Iron Age" of January 28th, 1892, particularly referring to Figs. 23, 25, on page 151; Figs. 52, 56 and 57 on page 153; and Figs. 76 and 78 on page 155.

In the various references made in all cases it is pointed out that the sections of the parts to be welded electrically together should be modified so as to be as nearly equal as possible to produce equal heating. Sometimes only two welding surfaces are brought together; at other times there are at the same time four welding surfaces brought together or more. In most cases the larger surfaces are reduced in size to the smaller by forging methods. In the case of Fig. 76 metal is removed and in Fig. 95, page 157 of the "Iron Age" article, the parts to be welded are cast in a mold to give the proper section.

In this Ferranti specification there is stated that

"In carrying out my invention according to one modification grooves may be cut across the edge of the ring"

and again, at another place, it is stated:

"Again, the ring may be built up of a set of thin laminae, the edges of which are notched, the laminae being assembled in such a way that the notches are 'stepped' with regard to each other, the intervening projections of metal thus following the shape of the turbine blades to be welded to them."

In the first of these modifications a machine formed surface is produced substantially of the section of the turbine blade to be welded thereto; in the second cited modification a similar section is produced from built-up laminated disks both of which are in substance like the weld produced in Fig. 9, patent 396,010 cited before, the difference being that in the patent the tits are forged and raised from the surface while in the Ferranti description the tits are produced by cutting away the solid metal.

In Fig. 76, page 155, "Iron Age" article, the bottom piece of a projectile is hollowed out and its circular section made to conform to that of the central body for the purpose of equalizing the heat at the weld.

The references given all clearly establish the fact that it was well understood that in order to electrically weld surfaces of unequal section together and produce a strong weld, the surfaces had to be shaped either by cutting away or by adding projections to bring about as near as possible equal heat at the point of weld.

(Attorney for Harmatta gives notice that he will refer at the final hearing to the publications and patents mentioned by the witness and as found in the records of the Patent Office.)

Q. 8. Referring to the statement of the description that according to one modification grooves may be cut across the edge of the ring, to what extent would the surface of the blade be welded to the carrier by following the procedure there referred to of modifying th surface as you understand it and in view of the statement of the inventor that the object to be kept in mind in the various modifications is to enable the temperature to rise to the welding point while at the same time leaving sufficient areas untouched to insure mechanical strength in the welding joint?

A. The object in any weld is to have as large a welded surface as possible to insure a strong mechanical joint. The inventor had evidently this featutre in mind; and considers that modification the best which would insure a weld extending over the whole surface of the turbine blade. In both of the modifications cited by me and particularly the one referred to in this question, a solid weld including the whole area of the blade would be produced.

Q. 9. Referring to the statement of the specification

"Again intersecting sets of grooves inclined to one another may be cut on the edge of the ring."

what does the description disclose to you as one skilled in the art at date of the filing of the provisional and speaking from the standpoint of your knowledge of the art of electric welding as to the width and number of the intersecting grooves?

(By Mr. Hall: Objection following Q. 6 is repeated.)

A. It would tell me that in order to secure the strongest weld the grooves cut into the surface of the ring would be made as narrow and as deep as possible to produce the proper heat and to maintain the continuity of the weld over as large a surface as possible.

Adjourned to 2 p. m.

Examination Continued:

Q. 10. Might or might not the weld resulting from the modification of the metal of the carrier in the manner referred to in your last answer involve practically the whole surface of the blade presented to the carrier?

(By Mr. Hall: Same objection.)

A. Yes, it might and the more it does the nearer it will comply with the conditions laid down by de Farranti to insure the greatest mechanical strength at the welded joint. The method of welding the blades on to the carrier is of course nothing more than the well known butt welding process known as the Thomson process in which the parts to be united, when brought to the welding heat, are pressed together and from this result an expansion of metal at the weld usually known as the burr which, in the particular modification described by Ferranti, would, in the final part of the operation, close up the gaps made by the slots or grooves and produce substantially one uniform welded surface between the carrier and the blade.

Direct examination closed.

Cross-examination without waiving objections made on the direct:

X-Q. 1. Is the Thomson Electric Welding Company a branch of or controlled by the General Electric Company?

A. If it is, it is news to me. I never heard such to be the case.

X-Q. 2. Where is the main office of the Thomson Electric Welding Company?

A. Lynn, Mass.

X-Q. 3. Do you know whether Mr. Elihu Thomson is associated with this company?

A. I believe he is a director in it and a stockholder.

X-Q. 4. Is Mr. Elihu Thomson associated with the Lynn works of the General Electric Company?

A. Yes, he is consulting engineer.

X-Q. 5. For many years he's had his office in the Lynn works of the General Electric Company, has he not?

A. Yes.

X-Q. 6. Referring to the so-called modifications stated in Q. 8, is it your understanding that the gaps made by the slots or grooves

would not be closed until the end or very near the end of the welding operation?

A. In the modification referred to, it is immaterial whether the slots are wide or not because the ridge formed by the cutting of the slots is evidently of about the same section as the blade to be welded thereto and in the upsetting part of the process the weld being enlarged may or may not come in contact with the metal on the other side of the slot on the carrier. The weld will be substantially a butt weld extending over the whole surface of the blade

(By Mr. Hall: The entire answer objected to as a mere volunteered statement in no wise responsive to the question.)

X-Q. 7. Now in answer to Q. 10 you said: * * * "an expansion of metal at the weld usually known as the burr which, in the particular modification described by Ferranti, would, in the final part of the operation, close up the gap made by the slots or grooves * * *." I ask you whether the closing of the gap would occur only at the close or near the close of the welding operation?

A. Before answering this question I want to draw attention of counsel for de Ferranti to the fact that my reply just quoted by him is in answer to a different modification than the one referred to in his previous question. With this understanding I will answer that in the modification referred to in Qs. 9 and 10 the closing up of the slot would take place during the last part of the welding operation when the metal is being upset by pressing the blade towards the carrier.

X-Q. 8. Is it your understanding that during the first part of the operation the carrier would contact with the opposed surface of the blade only at separated points on this surface?

A. It would in case of modification referred to in Qs. 9 and 10 but not in case of modifications referred to me in my reply to Q. 7.

X-Q. 9. And referring only to the modification referred to in Qs. 9 and 10, would the heating current during the first part of the operation be localized at these separated points?

A. It would be localized to exactly the contact surfaces which are being made at the beginning between the surfaces of the carrier in contact with the blade.

X-Q. 10. And referring to the modification of Qs. 9 and 10, is it your understanding that the carrier is provided peripherally with spaced apart tits or projections which contact at separated points with the opposed surface of the blade?

A. It is, but with the understanding stated by de Ferranti that these should be as numerous and as close together as possible consistent with producing the proper heating effect in order to obtain as large a welded surface of the blade to the carrier as possible.

Cross-examination closed.

(Counsel for Harmatta gives notice that at the final hearing he will refer to the following: Copy of provisional specifica-

tion of de Ferranti filed May 25th, 1903, No. 11,921, as found in the record of British patents in the Patent Office Library at Washington. De Ferranti's British patents Nos. 15,186 of 1903 and 11,921 of 1903. De Ferranti's United States patent No. 874,398, dated December 24th, 1907; 911,222, dated February 2nd, 1909; No. 1,148,221, dated July 27th, 1915. United States patent of Kleinschmidt, No 616,437, dated December 20th, 1898. United States patent to Cowdery, No. 481,663, dated August 30th, 1892. File wrapper and contents of de Ferranti's United States applications Serial Nos. 208,034 and 668,464.)

(Counsel for Harmatta will also urge at the final hearing all the grounds of his motion to dissolve filed May 4th, 1914, and October 28th, 1915.)

HERMANN LEMP.

Examination closed.

Adjourned subject to notice.

NOTARY'S CERTIFICATE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

County of New York, State of New York, ss:

I, George E. Brown, a notary public within and for the County and State of New York, do hereby certify that the foregoing deposition of Hermann Lemp was taken on behalf of Johann Harmatta in pursuance of the notice hereto annexed before me at the office of Townsend & Decker, 149 Broadway, New York City, State of New York, on the 28th day of March, 1916; that said witness was by me duly sworn before the commencement of his testimony; that the testimony of said witness was written out by Miss Irene Lefkowitz in my presence; that the opposing party, Sebastian Ziani de Ferranti, was represented by counsel during the taking of said testimony; that the deposition was read by the witness before the witness signed the same; that I am not connected by blood or marriage with either of said parties nor interested directly or indirectly in the matter in controversy.

In testimony whereof I have hereunto set my hand and affixed

my seal of office at New York City, County of New York, this 28th day of March, 1916.

(Seal) GEORGE E. BROWN.

Notary Public—Richmond County Certificate Filed in New York County, No. 179; New York Register No. 7223. Term Expires March 30, 1917.

Docket Clerk. 36,709—57.
Apr. 15, 1916.
U. S. Patent Office.

UNITED STATES PATENT OFFICE,

Testimony for Harmatta. (Batch 2.)

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

New York, N. Y., April 8th, 1916.

Messrs. Spear, Middleton, Donaldson & Spear,
Victor Building,
Washington, D. C.

Gentlemen:

PLEASE TAKE NOTICE that on Thursday, April 13th, 1916, beginning at 11 a. m., at the office of Townsend & Decker, 149 Broadway, New York, before George E. Brown, Notary Public in and for the County of New York or some other duly authorized officer, the party Harmatta will proceed to take the deposition of the following witness in his behalf in the above interference:

JAMES H. GRAVELLL of Philadelphia Pa.:

and possibly others. The examination will continue from time to time until completed and you are invited to attend and cross-examine.

TOWNSEND & DECKER,
Attorney for Harmatta.

Due service of the above notice admitted this 10th day of April, 1916.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for Harmatta.

620 Defendant's Exhibit No. 33.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

New York, N. Y., April 13th, 1916.

Testimony taken on behalf of Harmatta pursuant to the annexed notice at the office of Townsend & Decker, 149 Broadway, beginning at 11 A. M., April 13th 1916.

Present: MR H. C. TOWNSEND for Harmatta.
MR. WILLIAM F. HALL for de Ferranti.

JAMES H. GRAVELL.

JAMES H. GRAVELL, being duly sworn, deposes and says as follows in answers to interrogatories by Mr. Townsend:

Question 1. What is your name, age, residence and occupation?

Answer. My name is James Hardey Gravell; age 35; and business address is 1126 So. 11th Street, Philadelphia; occupation electrical engineer.

Q. 2. Have you any knowledge of or experience in the electric welding art and if yes, will you please state the nature and extent of it?

A. Upon my graduation from the Philadelphia High School I became associated with the Ellwood Ivins Tube Co., Oaklane, Philadelphia, where I had charge of experiments in electric welding. In 1900 I took up the work of experimenting in electric welding for the American Tube & Stamping Co., of Bridgeport, Connecticut, where I designed and built several special butt-welding machines and a machine for welding tubing. Since that time I have been connected with the Baldwin Locomotive Works of Philadelphia, the Philadelphia Electric Co. and the Hale & Kilburn Co., of Philadelphia, serving all in the capacity of an electrical expert During my carrer I have obtained quite a number of United States patents on welding.

Q. 3. Have you made any study or investigation of the history and development of the art of electric welding prior to 1903? If yes, please state the nature and extent of it.

A. At the year 1903 I had been engaged in electric welding for practically five years. I was specially familiar with welding as disclosed by the United States patents, having started an index on pat-

ents in the year of 1900 and was very careful to keep my index up to date.

(By Mr. Hall: Objected to for the most part as a mere conclusion and as secondary evidence.)

Q. 4. Are you familiar with the art of electric welding from the time of its origin to such extent as in your opinion to qualify you to testify from the standpoint of one ordinarily skilled in the art as it existed at the date May 25, 1903, when de Ferranti, party to this interference, filed his provisional specification unaccompanied by drawings in connection with proceedings for obtaining his British patent No. 11,921 of 1903?

(By Mr. Hall: Objected to as for calling for a mere conclusion.)

A. Having been connected with the industry for approximately five years at the time you state, namely May 25, 1903, both from a practical and engineering standpoint, I believe I am duly qualified to testify.

Q. 5. Have you read and considered the description forming the provisional specification filed by de Ferranti in connection with his application for his British patent No. 11,921 of 1903 and do you believe that you understand that description so far as it goes when taken apart from any drawings that may have been filed later by him in connection with his complete specification?

A. I have read the application carefully and believe I thoroughly understand it.

Q. 6. Referring to the first paragraph of the description forming that specification in which de Ferranti alludes to the difficulties which have been experienced in electric welding, will you please state how one skilled in the art at the time of the filing of that specification would understand that statement and particularly as to the nature of the difficulties and the particular kind of electric welding referred to? In giving your answer you may state what measures had been usually adopted in the art up to that time to overcome such difficulties.

(By Mr. Hall: Any and all testimony which the witness may give respecting prior art, structures or devices, is objected to upon the ground that it is incompetent, irrelevant and immaterial. It is so objectionable because permission has not been obtained for taking testimony in respect to such prior art structures, or has any motion been brought under rule 122 of the Rules of Practice directed to the non-patentability of the issue by reason of the prior art.)

A. At the time of Ferranti's application the only method of electric welding in which trouble had been experienced, when weld-

ing together two parts that differed greatly as regarding their thermal characteristics when heated at their point of juncture was what was known as the Thomson method. This difficulty is disclosed by Thomson in his original patent on electric welding in which he coins the term "electric welding." This patent is number 347,140. It is quite evident from the first paragraph in Ferranti's application that it was this difficulty disclosed by Thomson that Ferranti refers to. The heat in this system of welding depends on the thermal and electrical characteristics of the two bodies being welded. When one or the other of these characteristics differ greatly in the two bodies, unequal heating ensures, which results in either no weld or a defective weld. This was well recognized in the art prior to Ferranti's application and numerous methods had been proposed for eliminating this trouble. Many of these methods are disclosed by United States patents issued prior to Ferranti's application, namely:

347,140
347,141
396,010
434,530
487,302.

All these patents refer broadly in adjusting the volume of the metal in one part to that of the other part so that the thermal and electrical characteristics in the two bodies will be practically equal. In some cases, when welding a piece of large section to a small section, the larger section was reduced by forging or turning so that the section presented at the weld would be practically equal to that piece of the smaller section. In some cases the same result was obtained by holding the smaller piece close up to the weld in the copper clamp naturally a part of this process, so that it would keep the smaller piece which naturally attained a higher temperature than the larger piece, cool. When the larger piece was of such shape and size as to make it feasible, a lug or projection was provided by stamping or forging so as to present at the weld a section corresponding to that of the smaller piece. The difficulties that Ferranti refers to were well known to all skilled in the art at the time of Ferranti's application.

Q. 7. Will you please state more specifically what characteristics you refer to by the term "thermal characteristics" by explaining what would affect this characteristic and its relation to the operation of securing a proper heating of the metal to be welded.

A. Thermal characteristics are the properties of a substance relative to heat. The thermal characteristics which are considered in welding, as referred to by Ferranti, relate to the conduction of heat by the metal. The conduction of the heat by the metal depends on the cross-section of the path of escape of heat and on the nature of the metal. In Ferranti's case where he presents the end of a concave rod forming a blade to a disk which is relatively much larger than the blade, the periphery of which presents practically a

flat surface to which the end of the blade is to be welded, the thermal characteristics differ greatly because the escape of heat in the blade is restricted to a small path corresponding to the cross-section of the blade, whereas in the disk it is not restricted to a small path but quickly conducted through the whole disk. This would have a tendency to keep the disk cool because the heat generated in the disk by the current would be permitted to escape nearly as quickly as it was generated. This is said by Ferranti in his second paragraph only in slightly different words.

Q. 8. Will you please extend your answer to my last question by extending it to the prior art as it existed and was practiced prior to 1903?

(By Mr. Hall: Objection following Q. 6 is repeated.)

A. These thermal characteristics were well recognized prior to Ferranti's application as is illustrated in the patents already cited, which show that the thermal characteristics of the larger piece were altered by adjusting the volume of metal of the larger piece in the neighborhood of the welding point so that they would practically coincide with the thermal characteristics of the smaller piece, thereby producing equal heating in both bodies.

Q. 9. Assuming that one skilled in the art at the date of filing the de Ferranti provisional and as it existed at that date should proceed in the light of the art and of the de Ferranti provisional specification, taken apart from any drawings that may have been filed later in connection with the application for patent, to adjust the volume metal of the disk by forming intersecting sets of grooves inclined to one another, how would he proceed, in your opinion, in making said grooves as respects their spacing, width and depth? In giving your answer please state as fully as you can your reasons for any opinion you may express.

A. As Ferranti tells us in his specification that the object to be kept in mind is to insure a good weld and that only sufficient metal for this purpose, is to be removed, one skilled in the art at the time of Ferranti's application would, having this in mind, try to make the thermal characteristics of the two bodies as nearly equal as possible and would make very narrow grooves and of a depth practically equal to the distance between the copper clamp and the end of the blade. By making a number of thin grooves he would be enabled to restrict the path of the escaping heat to practically that of the path provided in the blade, thereby causing equal heating in the two bodies. By this method of procedure he would have adjusted the volume of the metal in the disk in the neighborhood of the welding point so that approximately equal heating would occur in both the end of the blade and the peripheral face of the disk in contact with the end of the blade.

Q. 10. Would the decreasing of the number of grooves affect what you call the thermal characteristics and if so, in what way?

A. The decreasing of the number of grooves, assuming the size of the grooves to remain the same, would tend to enlarge the cross-section of the path in the disk, thereby allowing a greater escape of heat from the welding point with a consequent cooling of that point, or, in other words, by reducing the number of grooves has the effect of cooling the disk at the welding point.

Q. 11. Assuming that one skilled in the art had proceeded to prepare the disk in the manner stated in your answer to Q 9, and had then proceeded to weld the blade to the disk or drum will you please state to what extent the edge of the blade would be involved in the weld? In giving your answer state how any result that you may specify would be brought about.

A. The blade would be brought in contact with the disk, the current would be passed from the blade to the disk, all the projections coming in contact with the blade formed by the cuts in the disk would become heated, the edge (by edge I understand it to mean the end of the blade) of the blade would become heated, pressure would be exerted between the two bodies, and upset would occur causing the projecting portions of the disk to mushroom or spread out, forming an arch construction from one projection to the other, resulting in a continuous surface under the blade to which the entire surface of the end of the blade would weld.

After recess:

Q. 12. Is there any other consideration that occurs to you that would guide one proceeding it cut the groove as suggested in the Ferranti specification in respect to the width of the grooves or the spaces between them?

A. As Ferranti says nothing about placing his blades in respect to the position of the grooves (and in fact when the invention is carried out by boring holes into the peripheral surface of the disk he says that the blades may be welded or arranged without particular reference to the position of the holes) it is quite necessary to have the grooves thin and quite numerous in order to make a like condition of the surface under each blade respectively; for otherwise, if the grooves are placed far apart, even if arranged regularly, it would require great care in placing the blades so that the same condition of surface would be presented to each blade respectively. This is especially true if the grooves are of any substantial width. As Ferranti does not caution us to be particular to place his blades according to the pattern produced by his groove, it naturally follows, in order to have the welding conditions the same at each blade respectively, that the grooves must be narrow and numerous, for it is only by this method that uniform results can be obtained. In a steam turbine it is essential that all the blades be equally spaced. Therefore, had Ferranti used any other style of groove except the kind which are narrow and close together, he would have been sure to tell us that these grooves would have to

be laid out according to a certain pattern so that a like condition of surface would occur under each blade respectively.

Q. 13. Have you ever had any actual practical experience in performing the operation of butt-welding by the Thomson Electric Welding process?

A. My duties at the American Tube & Stamping Co. of Bridgeport, Connecticut, in the years 1900 and 1901, required me to design butt-welders, to assemble the butt-welders and to actually operate the butt-welders which I had designed. It required my instructions as to how prepare the work which was to be welded and how to eliminate the burr which was formed in welding to produce the finished article. In some cases where a large section was to be welded to a small section to so adjust the volume in the large section so that it would not produce a cooling effect on the weld. My duties at this company required a knowledge of the hardening and softening properties in steel as applied to welding. It also required a knowledge of the chemistry of steel so that its welding properties could be determined beforehand. My duties at the Hale & Kilburn Co. of Philadelphia, required additional knowledge and a more expert manipulation of the welding machine, for at these works I was continuously confronted with new problems which were produced by the development of the steel interior finish of railway cars and of the all-steel construction of automobile bodies. At this company I was called on not only to design, construct and operate butt-welding machines, but was required to invent new processes, new apparatus and new products of manufacture as disclosed by my patents in the United States Patent Office. At one period of my career at the Hale & Kilburn Co. much of the welding consisted in welding a large section to a small section in which case I was obliged to adjust the volume of the metal of the large section so as to produce proper heating effects at the weld.

Direct examination closed.

Cross-examination without waiving objections made on the direct examination:

X-Q. 1. By whom are you now employed?

A. I have an engineering practice at 1126 So. 11th Street, Philadelphia. I am treasurer of the American Chemical Paint Co. of Philadelphia, and secretary of the Tilghman-Brooksbank Sandblast Co., all located at the same address.

X-Q. 2. It is your notion that you are testifying in this case as an expert?

A. It is.

X-Q. 3. Were you employed to testify in this case as an expert?

A. I was.

X-Q. 4. By whom?

A. By the Thomson Electric Welding Company.

X-Q. 5. Have you testified in other cases involving patents for electric welding machines or processes?

A. I have never been employed to actually testify but have been connected with another case relative to patents on electric welding.

X-Q. 6. Was that other case also in association with the Thomson Electric Welding case?

A. It was.

X-Q. 7. Do you recall what patents were involved in that case?

A. The case in question was the suit the Thomson Electric Welding Co. vs. Barney & Berry.

X-Q. 8. That suit was on the Harmatta patent which is involved in this interference, is it not?

A. It was.

X-Q. 9. Did you write out the substance of your testimony before testifying in this case?

A. I wrote out a discussion of the Ferranti interference, which was hardly the substance of my testimony today, although my testimony today was in accordance with the ideas set forth in my discussion.

X-Q. 10. And you referred to that memorandum in giving your testimony, particularly in answering Q. 13, did you not?

A. The only part I referred to was a tabulated list of patents to refresh my memory as to their patent numbers.

X-Q. 11. Didn't you refer to this memorandum in answer to Q. 13?

A. I did not.

X-Q. 12. During what period were you employed by the Baldwin Locomotive Works?

A. I believe it was the year 1904 although I'm not absolutely certain as to the exact date.

X-Q. 13. Was your employment for more or less than a year?

A. My employment was for less than a year.

X-Q. 14. What was your official rating at this time by this company?

A. I was hired by the Baldwin Locomotive Works by the Assistant Superintendent, Mr. Halsey, for the special purpose of developing a system of arc welding.

X-Q. 15. State your period of employment by the Hale & Kilburn Co.

A. I was employed by the Hale & Kilburn Co. for a period of five years, starting Jan. 1, 1910.

X-Q. 16. And what was your rating during that employment?

A. I was hired by Mr. E. G. Budd, Manager of the Company, especially for the purpose of developing spot-welding, butt-welding and arc-welding. My official title was engineer on electric welding.

X-Q. 17. Is it your notion that the description found in the de Ferranti provisional specification No. 11,921 is mis-descriptive of what is shown, for instance, in Figs. 1 and 2 of the de Ferranti complete specification No. 11,921?

(The witness is handed a printed copy of the de Ferranti British patent which includes the provisional specification, the complete specification and the drawings.)

(By Mr. Townsend: Objected to on the ground that it is improper cross-examination, the examination of the witness having been expressly confined on direct to the provisional specification which was unaccompanied by drawings and that the witness cannot be examined on cross as to the meaning of drawings not referred to on the direct and not in any way brought to his attention thereby. Counsel for Harmatta gives notice that he will hold opposing counsel strictly to the rule that by examining the witness upon those drawings he makes the witness his own and will be bound by the statements of the witness made in relation to those drawings. Counsel further reserves the right to move to strike out any cross-examination of the nature opened up by the question.)

A. This is the first I have seen of any drawings illustrating Ferranti's provisional specification. Fig. No. 1 illustrates fairly well that part of the specification where it says "Grooves may be cut across the edge of the ring." Fig. 2 illustrates diagrammatically without respect to the size of the grooves the part of the specification which says "Intersecting sets of grooves inclined to one another may be cut across the edge of the ring." These grooves are represented as being much wider than what I would have imagined from Ferranti's description, especially in view of the fact that Ferranti says the object to be kept in mind in this and in other modifications is to remove sufficient metal to enable the temperature to rise to the welding point * * * while at the same time leaving sufficient area untouched to insure due mechanical strength at the welding joint.

X-Q. 18. Now referring to what is shown in Fig. 2 of the de Ferranti specification No. 11,921, is it your notion that if one endeavor to make a weld with the projections spaced as shown in such figure, such upsetting of the projection would occur as to establish an arch from one projection to the adjacent projection?

(By Mr. Townsend: Same objection and notice it is agreed by counsel may stand without repetition as to all future questions of the same tenor as question 17.)

A. It will be noted in this drawing No. 2 that the projecting portions of the disk are of very slender cross-section and that only a small number of these projections engage the blade. Therefore the area of metal through which the current passes to the blade from the disk is of much less amount than the area of the blade. We therefore in this drawing have reversed the conditions which Ferranti says causes trouble. We now have a relatively large blade

to which are opposed very slender projections and unless the grooves are very shallow unequal heating will occur but in this case it will be the projections which get hot and not the blade. If, however, the projections are very short, if a weld is possible at all, it will occur as follows: The end of the blade will reach a welding temperature, the total projections will reach a welding temperature down to their roots, the body of the blade itself around the heated projections will become hot, and when the final welding pressure is applied which is necessarily called a welding operation, the blade will be forced against the projections upsetting them to such an extent that the blade at the welding temperature will reach the bottom of the groove and weld fast the same as when thermit is poured on relatively cool steel it raises the metal to the welding point and welds producing a weld across the entire blade.

(By Mr. Hall: The entire answer is objected to because it is a mere volunteered statement in no wise responsive to the question and simply serving to indicate the strong bias of the witness.)

X-Q. 19. Now having aired your views, please state whether, if one endeavors to make a weld with projections spaced as shown in Fig. 2 of the de Ferranti patent, such upsetting of the projections would occur as to establish arches between adjacent projections?

A. It is impossible to determine this answer from Fig. 2. This would all depend on how deep are the grooves.

X-Q. 20. Since you were retained in this case, have you made any actual experiment as a basis for the testimony which you have given and if so, when and where, and who was with you when the experiments were made?

A. I have made no tests or experiments since being retained in this case, but previous to that, however, I have often welded the end of a bundle of wires to a rod which presents almost an identical condition illustrated by Fig. No. 2 as well as that figure can illustrate.

(By Mr. Hall: All of the answer is objected to as a mere volunteered statement not responsive to the question except the part reading "I have made no tests or experiments since being retained in this case.")

X-Q. 21. About how long or what amount of time is required in making an electric weld of the character referred to in the de Ferranti provisional specification as you understand it?

A. It is impossible to determine from the de Ferranti specification how long it takes to make a weld. Nothing is stated regarding the dimensions of the material being processed and this is usually a determinning factor in the time required. Then, too, the speed of welding at the time of the Ferranti application was usually slower than it is at the present day.

X-Q. 22. How much time is required at the present day?

A. You would have to give me more specific information as to the time required in order to answer the question, that is, tell me the size of the blade and the size of the disk, and what variety of weld it is.

X-Q. 23. Well, I'll let you take, for instance, a turbine disk and a turbine blade, such as you know them; you may feel free to select the sizes and state them and tell us how long it would require "at the present day" and how long would have been required "at the time of the Ferranti application."

A. Taking the turbine disk as one-half of an inch thick and a blade of usual dimensions to correspond to that disk, and selecting the preparation of the disk as illustrated in Fig. 1 where grooves are cut across the face of the disk to make projections on the disk which correspond substantially to the shape and size of the blade, I would say, roughly speaking, the current would be on for a period of two seconds. This would not include the time of placing the work in the machine and removing the work from the machine. In the case which I have selected I do not believe the time would be materially different at the present day to what it was at the date of Ferranti's application.

X-Q. 24. And taking the case you have selected, are the parts to be joined pressed towards each other during the whole period the current is on?

A. The pressure applied is usually great at the start and as soon as the metal has been brought to a firm contact the pressure is reduced and at the completion of the weld the pressure is generally increased.

X-Q. 25. About how long does it take for the metal to become sufficiently plastic so that material change in the form thereof will occur taking the same example you have been referring to?

A. In the example which I have cited it would take practically two seconds because the current is stopped as soon as the metal is plastic enough. The final pressure referred to being only a momentary shove in the case of this light material which requires but an instant.

X-Q. 26. And does that shove take place before or after the current is stopped or shut off?

A. The current in usual practice in welding this light material, as in example, is cut off practically at the same instant the final pressure is applied.

Cross-examination closed.

Deposition closed.

J. H. GRAVELL.

 Defendant's Exhibit No. 33.

NOTARY'S CERTIFICATE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

County of New York, State of New York, ss:

I, George E. Brown, a notary public within and for the County and State of New York, do hereby certify that the foregoing deposition of James Hardey Gravell was taken on behalf of Johann Harmatta in pursuance of the notice hereto annexed before me at the office of Townsend & Decker, 149 Broadway, New York City, State of New York, on the 13th day of April, 1916; that said witness was by me duly sworn before the commencement of his testimony; that the testimony of said witness was written out by Miss Irene Lefkowitz in my presence; that the opposing party, Sebastian Ziani de Ferranti, was represented by counsel during the taking of said testimony; that the deposition was read by the witness before the witness signed the same; that I am not connected by blood or marriage with either of said parties nor interested directly or indirectly in the matter in controvesy.

In testimony whereof I have hereunto set my hand and affixed my seal of office at New York City, County of New York, this 13th day of April, 1916.

(Seal) GEORGE E. BROWN.

Notary Public—Richmond County Certificate Filed in New York County, No. 179; *New York Register No.*, 7223. *Term Expires March* 30, 1917.

2—208.—W.F. 36,709—58.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

April 15, 1916.

BEFORE THE EXAMINER OF INTERFEREFCES.

IN THE MATTER OF THE INTERFERENCE OF

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

SIR:

You are hereby informed that the testimony, in behalf of Johann Harmatta have been received and filed. (2 batches.)

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

6—1962

Johann Harmatta, c/o
Townsend & Decker,
No. 149 Broadway,
New York, N. Y.

36,709—59.

Docket Clerk
April 17, 1916.
U. S. Patent Office

Application Room.
April 17, 1916.
U. S. Patent Office.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE NO. 36,709.

It is hereby stipulated and agreed that the time for taking the rebuttal testimony of de Ferranti be extended to include June 8th, and the final hearing be extended accordingly.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

632 Defendant's Exhibit No. 33.

2—224.—JHD Paper No. 60.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

April 19, 1916.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652.

The stipulation filed herein April 17, 1916, is approved, and times are fixed as follows:

Rebuttal testimony of De Ferranti to close June 8, 1916.

Final hearing August 9, 1916, at 11 A. M.

Because of the long period of time which this interference has been running, the Office will not be in position to further extend the time for testimony or the final hearing. The hearing has been set for August 9, 1916, and the parties are expected to be prepared for the hearing on that date.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
June 2, 1916.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Messrs. Townsend & Decker,
149 Broadway,
New York, N. Y.

GENTLEMEN:

Please take notice that on Tuesday, the 6th day of June, at ten o'clock in the forenoon, or as soon thereafter as counsel can be heard, before the Examiner of Interferences, we shall present a motion to strike out or suppress, of which a copy is annexed hereto, and a motion for an extension of De Ferranti's time to take testimony for a period of thirty (30) days, commencing to run after the determination of the motion to strike out or suppress.

Very respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,

June 1st, 1916.
KFH/HLD.

634 Defendant's Exhibit No. 33.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

And now comes the party De Ferranti, above named, by his attorneys and moves as follows:—

(1) That questions 5, 6 and 7 and answers thereto, occurring in the deposition of Herman Lemp, the questions 6 and 8 and the answers thereto, occurring in the deposition of James H. Gravell, be struck out, or suppressed, because they relate solely to the alleged prior state of the art and not to the question of priority of invention between the parties to this interference, or the quesion of De Ferranti's right to make claims corresponding to the issue of the interference.

(2) For an extension of De Ferranti's time to take testimony for a period of thirty days, commencing to run after the final determination of the above motion to strike out or suppress.

Very respectfully,

SEBASTIAN Z. DE FERRANTI,

By SPEAR, MIDDLETON, DONALDSON & SPEAR, *Attys.*

WFH/HLD.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Washington, District of Columbia, ss:

I, James M. Spear, being duly sworn, depose and say that I am of counsel for the party De Ferranti, above named, and am familiar with the proceedings heretofore taken in this interference.

That the testimony taken on behalf of Harmatta relates principally to the right of the party De Ferranti to make claims corresponding to the counts of this interference, and in order to meet this testimony deponent thinks it highly desirable to examine one or more experts specially skilled in the art of electric welding.

Deponent's firm communicated with their principal, who resides

in Great Britain, in respect to this matter and also investigated available experts in this Country. The latter experts, of which deponent's firm had knowledge, were found on investigation to be so connected with Harmatta, or his assignees, that they would be unavailable on behalf of the party De Ferranti in this case.

It was hoped to take the testimony of De Ferranti in this Country but it was found that he is now engaged in making war ammunitions on behalf of Great Britain and cannot leave that country for the purpose of coming to this Country to testify in the case.

The questions involved herein are unusually technical and it is consequently very difficult to find one competent to testify, particularly in view of the connection of the many experts in this line with the party Harmatta or his assignees.

Furthermore deponent sayeth not.

JAMES M. SPEAR.

Sworn to and subscribed before me this first day of June, 1916.

BENNETT S. JONES,
Notary Public.

(Seal)

WFH/HLD.

IN THE UNITED STATES PATENT OFFICE

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

AFFIDAVIT.

City of Washington, District of Columbia, ss:

I, Bessie I. Bishop, being of lawful age, being duly sworn, depose and say that on June 1st, 1916, I sent by registered mail to Messrs. Townsend & Decker, 149 Broadway, New York, N. Y., copies of the annexed papers in the above entitled interference.

BESSIE I. BISHOP.

Subscribed and sworn to before me this 2d day of June 1916.

BENNETT S. JONES,
Notary Public.

(Seal)

RECEIPT FOR REGISTERED ARTICLE.—No. 187128.

Class postage 1
WASHINGTON (STA G) D. C.
Registered
June 1, 1916.

636 Defendant's Exhibit No. 33.

2—224.—LBF Paper No. 62.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 7, 1916.
Mailed " " "
Interference Division.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

BEFORE THE EXAMINER OF INTERFERENCES.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652.

This case is before me on motion by De Ferranti, filed June 2, 1916, asking (1) that certain questions propounded to Harmatta's witnesses Lemp and Gravell, together with the answers thereto, be suppressed; (2) that De Ferranti's time for taking testimony be extended to run thirty days from the determination of the first part of the motion.

(1) There is no sufficient reason why the examiner should attempt to pass upon the propriety of the questions objected to at this time. It is always difficult to rule satisfactorily upon a few segregated questions without considering other portions of the record. This part of the motion will be continued until final hearing.

(2) The motion to extend De Ferranti's time will be granted.

The motion to strike out is deferred until the case comes on for final hearing on the merits.

The second part of the motion is granted and De Ferranti's time for rebuttal testimony is fixed to expire July 8, 1916.

Final hearing September 8, 1916, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
July 6, 1916.
U. S. Patent Office.

36,709—63.
Application Room.
July 6, 1916.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

It is hereby stipulated and agreed that De Ferranti's time for taking testimony in rebuttal, in the above entitled case, be extended two months from the date now set. The evidence required in rebuttal will be of an expert character largely, and in correspondence with the British Patent Attorney representing De Ferranti it has been ascertained that Mr. De Ferranti and every other leading expert is engaged in Government work in England, and it is not only impossible to secure the attendance of Mr. De Ferranti or any English expert on this side but we are still further advised that no leading expert could give attention to this matter at the present time even to answer interrogatories or to give evidence orally under a stipulation, and it is therefore imperative that further extension be secured of the time now set. As counsel for Harmatta have expressed themselves as quite willing to stipulate for this further extension it is urgently requested that the Office approve the stipulation without question under the circumstances.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for Ferranti.

Not admitting that testimony properly in rebuttal of that given for Harmatta could be of such nature that it cannot be taken in this country at all, we consent to an extension of De Ferranti's time one month.

TOWNSEND & DECKER,
Attorneys for Harmatta.

638 Defendant's Exhibit No. 33.

IAW 2—224 Paper No. 64.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

July 7, 1916.
Mailed " " "
Interference Division

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents

6—1652

The stipulation filed herein July 6, 1916, is approved to the extent that De Ferranti's time for rebuttal testimony is fixed to expire August 8, 1916.

Final hearing: October 10, 1916, at 11 A. M.

It is noted that the stipulation calls for an extension of two months, but inasmuch as counsel for Harmatta has consented to but one month, the stipulation is approved to the extent above indicated.

H. E. STAUFFER,
Examiner of Interferences

Defendant's Exhibit No. 33. 639

Application Room.
Aug. 7, 1916.
U. S. Patent Office.
Docket Clerk.
Aug. 7, 1916.
U. S. Patent Office.

36,709—65.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE 36,709.

It is hereby stipulated and agreed that the time for taking rebuttal evidence in behalf of De Ferranti in the above entitled Interference be extended two months from the date now set.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta

LBF 2—224 Paper No. 66.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

August 9, 1916.
Mailed " " "
Interference Division

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

The stipulation filed herein October 7, 1916, is approved and times are extended as follows:

Rebuttal testimony of De Ferranti to close Nov. 9, 1916.

Final hearing: January 9, 1917, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences

Docket Clerk 36,709—70.
Nov. 22, 1916.
U. S. Patent Office.

Testimony and Exhibits for de Ferranti. (In box.)

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

INTERFERENCE No. 36,709.

Messrs. Townsend & Decker,
149 Broadway, New York, N. Y.

Gentlemen:

Please take notice that on Friday, the 10th day of November, 1916, at 10 o'clock in the forenoon, at our office, Victor Building, Washington, D. C., before Bennett S. Jones, a Notary Public, or other competent officer, we shall proceed to take testimony in the above entitled case on behalf of the party de Ferranti.

The witness to be examined is Frank L. Dyer, whose office address is 31 Nassau Street, New York City, and perhaps others whose names and addresses are not now known but of which you will be given due notice.

Proceedings will be adjourned from day to day and to such time and place as may be found necessary.

You are invited to attend and cross-examine.

Respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

Service accepted this 6th day of November, 1916.
TOWNSEND & DECKER,
Attorneys for Harmatta.

UNITED STATES PATENT OFFICE.

In re Interference:

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

Washington, D. C., November 10th, 1916.

Testimony taken on behalf of De Ferranti pursuant to notice annexed hereto commencing at the Office of Spear, Middleton, Donaldson & Spear, Victor Building, Washington, D. C., Friday, November 10th, 1916, at 10 o'clock in the forenoon before Bennett S. Jones, Notary Public.

Present: MESSRS. H. C. TOWNSEND and C. F. TISCHNER, on behalf of Harmatta;
WILLIAM F. HALL, on behalf of De Ferranti.

FRANK L. DYER, ESQ.

FRANK L. DYER, ESQ., a witness produced on behalf of De Ferranti, having been first duly sworn to testify to the truth, the whole truth, and nothing but the truth in answer to interrogatories, testified as follows:

Question 1. What is your name, residence and occupation?

Answer. Frank L. Dyer, age 46, Montclair, New Jersey: I am engaged in the manufacturing business with factories at Bloomfield, New Jersey, and Wyandotte, Michigan.

Q. 2. The case in which your testimony is being adduced is an interference pending in the United States Patent Office relating to methods of electric welding and involving the question of the disclosure of this invention in and by a certain foreign British patent. What experience have you had which qualifies you to testify as an expert in this case?

A. I have been intimately connected with matters relating to patents and inventions for upwards of thirty years and have had occasion to prosecute before the Patent Office several thousand applications for patents relating to many and diverse arts including the art of electric welding. I have made many inventions myself on which over one hundred applications for patents have been filed, many of them relating to electrical subjects. As a result of my work as an inventor, although not an engineer, I was elected an associate of the American Society of Mechanical Engineers. I was in active practice as a Patent Lawyer from 1892 to 1908, during

(By Mr. Townsend: Same objection and notice. Also objected to as leading.)

A. I do. The De Ferranti provisional specification refers to the difficulties experienced by the patentee "in electrically welding together the two parts which differ considerably as regards their power of rising to the required welding temperature when heated at the point of junction" (page 1, lines 6-8). It is, therefore, clear that the specification relates to an electric welding process in which the welding heat is secured by the resistance of the two pieces to be joined as distinguished from processes in which an electric arc is used. In a broad and general sense this is the so-called Thomson process originally invented and patented by Prof. Elihu Thomson about the year 1886. In the De Ferranti provisional specification the inventor refers to the desirability of so carrying the process out as to secure substantially uniform welding conditions at the point of junction when the two parts which are welded together differ considerably in mass, or in other respects differ considerably as regards their power of rising to the required welding temperature. The specification discloses a number of ways by which the welding process may be carried into effect, some of which, in my opinion, comply with the limitations of the claims in issue herein. I have prepared and present herewith drawings illustrating the several suggestions made by De Ferranti and disclosed by him in the provisional specification. Figure 1 illustrates the suggestion that "grooves may be cut across the edge of the ring" (lines 20 and 21). With this suggestion, assuming the invention is carried out in connection with welding a series of turbine blades to a suitable carrier, the turbine blades will be welded to projections on the carrier by a butt-welding process and not by the particular method disclosed in the claims in issue. Figure 2 discloses the arrangement suggested by De Ferranti in the statement "or several grooves may run circumferentially completely around the edge" (page 1, lines 21 and 22). In this figure I also illustrate on an enlarged scale the under face of one of the turbine blades showing the area of the several welds by section lines. These welds in Figure 2 correspond to the spots or distinct or separate spots separated from one another by well defined areas of no union as defined in the claims in issue. In other words, with the arrangement shown in Figure 2, the welds occupy only a part of the surfaces to be secured together, thus localizing the current within circumscribed paths and effecting a more rapid and economical welding operation than when the entire area of the surfaces constitutes the weld. In Figure 3, I illustrate the suggestion of De Ferranti described by the words "or, again, intersecting sets of grooves inclined toone another may be cut on the edge of the ring" (page 1, lines 22-23). In this figure I also show on an enlarged scale the underside of one of the parts (in this case a turbine blade) illustrating by sectional lines the well defined spots or areas constituting the plurality of welds and by means of which the

welding current will be localized within restricted or circumscribed areas. This particular figure is that of the De Ferranti drawing in interference and manifestly it corresponds with the restrictions and limitations of the claims. In Figure 4, I illustrate the arrangement which is described by the words "radial holes may be bored a short distance into the edge, either arranged in patterns, so as to leave intervening projections of untouched metal to which the blades may be welded" (page 1, lines 24-26). The weld in this case corresponds substantially to Figure 1, is coextensive with the entire area of the turbine blade and does not correspond with the limitations of the issue. In Figure 5, I illustrate the arrangement disclosed in the De Ferranti provisional specification by the words "or arranged without particular reference to the position of the blades" (page 1, lines 26-27). In this figure I show on an enlarged scale the under face of the turbine blade illustrating the area of the welds which are arranged in spots or defined areas so as to localize the heating current and this arrangement also, like those of Figures 2 and 3, corresponds to the limitations of the issue. In Figure 6, I illustrate the suggestion made in the provisional specification and described by the words "Again, the result aimed at may be secured by boring holes through from face to face of the ring at a radius slightly less than that of its outside edge." (Page 1, lines 32-33). With this suggestion the area of the weld will correspond to the entire engaging face of the turbine blade and therefore this particular suggestion does not correspond with the limitations of the issue. In Figure 7, I illustrate the suggestion described in the provisional specification by the words "the ring may be built up of two or more thinner rings held in their relative positions by distance pieces or in any other convenient manner, the blades being then welded in position on their outside edges" (page 1, lines 34-37). In this figure I also illustrate on an enlarged scale the bottom face of the turbine blade illustrating by sectional lines the area of the welds which are thus located in spots or well defined areas by which the heating current will be localized. Finally, in Figure 8, I illustrate the arrangement described by De Ferranti in the provisional specification by the words "Again, the ring may be built up of a set of laminae, the edges of which are notched, the laminae being assembled in such a way that the notches are "stepped" with regard to each other, the intervening projection of metal thus following the shape of the turbine blades to be welded to them." (Page 1, line 38; page 2, line 2). Assuming that with this arrangement the laminae are arranged closely together so that the projections referred to will constitute a substantially continuous surface to which the turbine blades are electrically welded, I find that with this suggestion the weld will occupy substantially the entire area of the bottom face of the turbine blade and will not correspond to the limitations of the issue. I do find, however, that the De Ferranti provisional specification, as illustrated in Figures 2, 3, 5 and 7, suggests a method of welding electrically two pieces of metal together

By spot welding, as I understand it, is meant the welding together of metallic pieces or surfaces, by a plurality of separate isolated welds separated by surfaces of non-union, the heating current being confined to or circumscribed by the restricted areas corresponding to the welds. In the De Ferranti divisional specification, means are suggested and methods are disclosed by which a satisfactory welding operation can be effected between two metallic pieces, one of which may be of enormously greater mass than the other, and by which the welding conditions as to these highly dissimilar parts may be made substantially constant. But De Ferranti in his provisional specification makes a further suggestion, and that is the welding of two metallic pieces together in a series of isolated defined spots separated by areas of non-union, and this latter suggestion is just as applicable to the securing together of metallic pieces having the same mass as the securing together of metallic pieces having widely different masses. Now referring to the Rietzel patent, to which you call my attention, particularly to Figures 1 to 3, I find that this patent discloses the same suggestion made by De Ferranti of securing together two metal pieces by a series of isolated welds, by which the current will be localized, but Reitzel suggests thus spot welding together two metal pieces of substantially the same mass, but the method followed, as I have said, is the same whether the masses are different or are substantially equal. In Figure 3, Reitzel shows one of the metal pieces as being formed with projections which are cast thereon, so that he is here dealing with a cast metal object as distinguished from sheet metal produced by a rolling operation and in which casting would be impossible. Now, so far as I can see, the projections shown by Reitzel, in Figure 3, correspond exactly to the projections disclosed by De Ferranti as being formed by cutting cross grooves in the ring, as I show in Figure 3 of the Exhibit, "Dyer Sketch." The only difference is that with Rietzel the projections are cast on one of the objects to be welded while with De Ferranti the projections are formed by cutting grooves in the metal object presumably by means of a milling machine. If the suggestion of De Ferranti is carried out for securing together two flat cast plates, such as Rietzel shows in Figure 3 of his patent, I am not able to perceive the slightest difference between the methods suggested by the two inventors with the single exception that with Reitzel the projections which define the spots and localize the current are formed by casting, while with De Ferranti the projections which define the spots and localize the current are formed by cutting grooves in the surface of the plate.

Recess.

Q. 7. Please consider the alleged prior art items referred to in the testimony adduced herein on behalf of the party Harmatta and state whether or not the disclosures which you find therein in anywise alter the opinion you have expressed that the invention defined by the issue of this interference is fully disclosed in the De

Ferranti British provisional patent to which you have referred? You may give your reasons for any statement you may make in this connection.

A. By prior art items I understand you mean the prior patents and publications referred to by the witnesses Lemp and Gravell, whose testimony has been taken on behalf of Harmatta, and with this understanding I will state that I have considered the same and do not find therein anything that in any way alters or effects the opinions I have already expressed concerning the sufficiency of the Ferranti provisional specification. Mr. Lemp refers to Thomson patent No. 347,141 as showing in Figure 8 a knife blade which "is champered to meet the diameter of the ax handle." I do not find this specifically described in the patent but I see no reason to question the correctness of Mr. Lemp's statement. This, however, is purely butt welding in which the weld occupies or is co-extensive with the entire area of the surfaces to be joined and is in no way analogous to or suggestive of spot welding. Mr. Lemp also quotes from the Electrical World of Dec. 25, 1886, in which the statement is made that when the pieces to be joined are of different metals, or of different sections, "the abutment or meeting point is placed nearer the clamp carrying the most resisting metal: or, the piece of smaller section, or the metal most readily fused, as the case may be, is so placed as to project least, for the purpose of favoring the accumulation of heat in the other piece," and Mr. Lemp also quotes from this article the statement that when the pieces are of different diameters "the end of the large piece is reduced to the size of the smaller before attempting to effect the weld." All of this I am quite prepared to admit was the practice in connection with butt welding but it has no relation or analogy to the more recent art of spot welding in which the pieces to be joined are secured together by a series of separate isolated welds which localize the heating current and which are separated by surfaces of non-union. Mr. Lemp also referred to Thomson patent No. 396,010 and calls attention to the knob or projection *b* to which the ends of the tool handle is butt welded by the old and well known butt welding method, even to the extent of the formation of a burr or fin as shown in Figure 12, which requires to be removed by a separate finishing operation but which presents no difficulty in spot welding. I see no analogy in this patent to spot welding in any sense of the word. All that it shows is a butt welding method. It does not disclose the welding together of two metal pieces by a series of isolated welds which localize the current and which are separated by surfaces of non-union. Mr. Lemp also refers to Thomson patent No. 434,530, Figure 10, but makes no comment thereon, at least specifically. I do not know whether this Figure shows a rod, bar, or plate. All that it clearly shows is the formation of two butt welds and is in no way suggestive of spot welding. He also refers to Thomson patent No. 487,302, Figure 4, showing a piece of carriage hardware, not otherwise identified, provided with two projections to which two pieces A and B are welded by an ordinary

butt welding operation. It is impossible to say whether the pieces A and B are rods, bars, or plates, but it is clear that nothing is here suggested of a spot welding process in which two metal pieces are joined by separate isolated welds localizing the current and separated by surfaces of non-union. Mr. Lemp finally refers to Figures 23, 25, 52, 56, 57, 76, 78 and 95 of an article on electric welding appearing in the Iron Age of January 28th, 1892, but I do not find in any of the examples shown in this publication the suggestion of spot welding two metallic pieces together, as I have explained.

I do not understand that Mr. Lemp refers to these instances of the prior art for the purpose of showing spot welding but only for the purpose of showing "that the sections of the parts to be welded electrically together should be modified so as to be as nearly equal as possible to produce equal heat." At best this merely relates to the suggestion made by De Ferranti that when the parts to be welded together differ widely in their thermal characteristics or mass, provision is to be made to so equalize conditions as to bring the adjacent surfaces to the welding temperature with substantial uniformity. The references to which Mr. Lemp refers do not, so far as I can see, have any relation whatever to the second suggestion made by De Ferranti, namely, that two metallic pieces may be joined by a series of separate isolated spots localizing the current and separated by surfaces of non-union. The references to the prior art made by Mr. Gravell seem to relate to prior Thomson patents, substantially all of which were considered by Mr. Lemp. According to Mr. Gravell: "all these patents refer broadly in adjusting the volume of the metal in the one part to that of the other part, so that the thermal and electrical characteristics in the two bodies will be practically equal." This also relates only to the suggestion of De Ferranti regarding the welding of two pieces together when they have widely different characteristics and has no connection whatever with the other suggestion made by De Ferranti of securing two metal pieces together by a series of spot welds localizing the current and separated by surfaces of non-union. In fact, so far as I can judge, the testimony of both Mr. Lemp and Mr. Gravell seems to be directed essentially to the single point of securing uniform terminal conditions when two pieces widely different in mass are to be welded together. As I understand it, the claims in issue have nothing whatever to do with this particular feature. They appear to have overlooked entirely the other suggestion made by De Ferranti of spot welding two metallic features together by means of a series of isolated separated welds which cause the current to be localized and restricted to the spots in the same way as suggested in the Dietzel patent. It seems to me that it is quite clear that this latter suggestion is independent of the former suggestion and is just as applicable to the welding of metallic pieces which are of practically the same mass as the welding together of pieces that differ widely in mass. In point of fact, the Rietzel patent discloses how this method can be carried out in connection with

sheet metal or with cast plates which presumably do not differ materially in mass.

Q. 8. The witness Lemp in answer to Q. 10 refers to "The conditions laid down by De Ferranti to insure the greatest mechanical strength at the welded joint," and in answer to cross-question 10 in referring to the projections he says "these should be as close together as possible consistent with producing the proper heating effect in order to obtain as large a welded surface of the blade to the carrier as possible." Do you find any warrant in the De Ferranti provisional specification for these statements, or any statement which would lead you either to agree with, or disagree from, the statement of Mr. Lemp?

A. No, I do not find anything in the provisional specification confirming these statements of Mr. Lemp. In fact, it would appear to me that the provisional specification gives precisely the opposite constructions. The statement in the provisional specification—"at the same time leaving sufficient areas untouched to insure due mechanical strength in the welded joint"—conveys to my mind the meaning that the area of the isolated welds is made large enough to give the necessary mechanical strength to the joint and that if a joint will be mechanically strong enough by utilizing for example 10 per cent of the area of the adjacent surfaces for the total, or aggregate, welding area, then 90 per cent of the opposed surfaces will represent areas of non-union. Mr. Lemp takes the position that with the provisional specification the instructions at all times are to secure the greatest possible mechanical strength, but, as a matter of fact, all that De Ferranti seeks to obtain is "due mechanical strength." If the maximum mechanical strength was desired assuming that all conditions are equal, then a joint which occupied the entire area of the turbine blade would be obviously stronger mechanically than one which occupied only a portion of that area. But De Ferranti does not indicate any preference for the former as against the latter, and therefore I should say that any skilled person reading the provisional specification and finding the suggestion of spot welding disclosed therein would so arrange the spots, or projections, as to give only sufficient, or in other words, due mechanical strength to the joint, and hence would seek to minimize the total area of the welded portion and to maximize the total area of non-union.

Q. 9. Testifying in this case Mr. James H. Gravell in answer to Q. 9 in part said as follows: "As Ferranti tells us in his specification that the object to be kept in mind is to insure a good weld and that only sufficient metal for this purpose is to be removed * * *." Do you find in the De Ferranti provisional specification any warrant for this statement?

A. No, I do not. The reasons for this opinion, I have pointed out in connection with substantially the same statement made by Mr. Lemp. All that De Ferranti considered necessary was to secure a weld of due mechanical strength and this is what will define the extent of the total welded area. If sufficient mechanical

X-Q. 21. Are they practically a reproduction of the sketches?
A. They are.

X-Q. 22. At the time you made the sketches had you made a study of the drawing and specification of the De Ferranti application involved in the interference 36,709?

A. No, I cannot say that I had. I have purposely refrained from considering the complete specification of Ferranti and limited myself to a critical study of the provisional British specification. I cannot say that I have not seen the drawings filed with the complete specification but I have never critically examined them. I did not see the Ferranti American specification involved in this interference until today. The sketches made by me were, so far as I could, made from a consideration of the provisional specification alone.

X-Q. 23. As a matter of fact, the drawings introduced as Dyer drawings are the same as some of the drawings of the complete British application of De Ferranti, excepting as to the added sectional figures appearing to the left of Figures 2, 3, 5 and 7, is not that the case?

A. Yes, substantially so, for example, my Figure 1, which was my understanding of the provisional specification, corresponds to Figure 1^a of the De Ferranti complete specification but differs in respect that the ring supporting the blades is shown as corresponding to the width of the blades, whereas in Figure 1^a of the complete specification, the blades overhang the ring. Of course, having seen the drawing forming part of the complete specification, one's mind probably consciously adopts forms of illustration. But to a person familiar with turbine construction, I should say that the drawings, as I have made them, from the provisional specification, would correctly illustrate the disclosures thereof.

X-Q. 24. In turbine construction is the aim of the constructor as a general rule, to form as complete, strong and extensive a union or homogeneity of structure of the blade and carrier having in view the great circumferential stresses to which the blades are subjected in the operation of the turbine?

A. No. It is only necessary that there shall be due mechanical strength between the turbine blade and the carrier.

X-Q. 25. Do you mean that there is no factor of safety considered or taken into account in the art of turbine construction, or to otherwise put it that the constructor aims to keep this union down to what he may consider due strength?

A. I mean that it is not necessarily the aim of the constructor to obtain the greatest or maximum mechanical strength. All that he desires is to secure due mechanical strength, having regard for a proper factor of safety. What I mean by this I can illustrate by an experience which we had at the Edison laboratory when Mr. Edison was developing a railroad car for operation with the storage battery. He wanted to make the car as light as possible and made careful tests of standard railroad cars to see in what respect they could be lightened. He discovered, for example, that the

steps of standard railroad cars have a breaking strain of 130,000 pounds, which of course is many times more than the maximum strain to which they would ever be subjected. Now this, as I understand it, is true with turbine construction. If we refer to the Ferranti complete specification, we find, for example, that in Figure 5 the turbine blade is welded to the carrier thoughout its entire area, whereas in Figure 3, for example, the area of the weld is probably less than 50 per cent of the total. No preference is expressed by De Ferranti for one construction over the other and as he is one of the greatest engineers and machine designers in the world, there is no doubt that when the weld is limited to a part of the available area sufficient strength for the purpose is secured. And, of course, the amount of strength between the welded surfaces depends upon the use to which the process is put. If the strains tending to separate the part are not severe, the area of welding will be proportionately decreased.

Adjourned until tomorrow at 10 A. M.

November 11th, 1916.

Met pursuant to adjournment. Parties present as before.

Cross-examination of Mr. Townsend continued.

X-Q. 26. Have you refreshed your mind as to the nature of the welding operations which you allude to at the end of your answer 2 as having been witnessed by you and can you now state definitely what those operations actually were?

A. Yes, I find that the operations referred to were those described and claimed in patent No. 645,066 to Brown & Morse in which carbon electrodes were employed to produce the heating effect.

X-Q. 27. In those operations which you state were actually witnessed by you, was union effected by a solder or spelter interposed between the pieces to be joined and brought to a proper temperature by means of the heat conducted from the carbon electrodes?

A. That I do not recall. I observe that the claims of Brown & Morse, appearing in the Official Gazette, refer to "welding or brazing." With a welding operation the joint is secured by an actual fusion of the surfaces of the pieces to be joined. With a brazing operation an additional metal of lower melting point is used to effect the joint. At this date, almost 20 years after witnessing the operation, I do not recall whether the process was carried out with or without a spelter.

X-Q. 28. If you do not recall whether the union was effected by spelter, how can you say that you witnessed actual welding operations?

A. I referred to this matter only in a most incidental way and had no idea that it would be considered of more than passing in-

terest. I had a very fixed and definite recollection that the subject matter of the interference referred to was an electric welding process, but when I now refer to the claims and find that they speak of brazing also, I do not like to state positively that the operations I witnessed may not have been electric brazing. However, whether the operation was welding or brazing the two methods are very closely allied.

X-Q. 29. Have you ever personally done electric welding by an actual welding operation as distinguished from an operation which is in fact soldering, the solder being heated by an electric current?

A. No, I have not.

X-Q. 30. Do you recognize a well-defined difference in principle between electric welding by the what is some times called the electric resistance process wherein the pieces are brought to welding temperature by the development of internal heat in them and an electric soldering process, such as that which may have been witnessed by you as you now state?

A. I recognize fundamental distinctions between a process in which heat is developed by the internal resistance of the metals to be joined and that in which heat is developed in an exterior mass such as a carbon electrode. There is, of course, a distinction between electric welding in which the surfaces to be joined merely reach a condition of plasticity and electric soldering in which a metal having a lower melting point is actually melted and becomes liquid, but the two processes may be very closely allied. If, for example, the separate pieces C' shown in Figure 5 of the Rietzel patent were properly chosen with respect to melting points of the plates to be joined, I should say that such a process would be electric soldering or brazing.

X-Q. 31. Have you ever at any time witnessed or performed the operation of electric welding by the Thomson process as applied to a butt welding of pieces of metal?

A. I don't recall that I have.

X-Q. 32. Would the process described by De Ferranti in his provisional specification be carried out if the intersecting grooves were made narrower than those shown in your drawing, Figure 8, in proportion to the size of the intervening projections shown in your drawings?

A. I should say that so far as De Ferranti's suggestion of spot welding is concerned, it would be carried out in any connection where there is a series of separated and isolated welds localizing the current and with surfaces of non-union. According to the instructions of the De Ferranti provisional specification, the total combined area of these isolated welds is sufficient to give due mechanical strength. When the process is used in an art requiring great mechanical strength the total area of the isolated welds should be greater than when the process is carried out in an art where great mechanical strength is not required.

X-Q. 33. Could the approximately equal heating referred to by

the patentee in his provisional specification in the clause stating that "the invention, therefore, consists broadly in adjusting the volume of the metal of the disc, etc.," be secured if the grooves as shown in your drawing Figure 3 were made relatively narrower than therein shown? What I mean is in proportion to the size of the intervening projections.

A. The size and depth of the grooves defining the character of the projections would, in my opinion, be a matter of determination for each class of work to which the process is applied. The grooving of the larger element in any way, however ineffective, would be an approach towards uniformity and how nearly uniform the conditions must be to comply with this part of De Ferranti's invention I would not undertake to say because, as I understand it, this feature is not involved herein. When, however, the question of spot welding is concerned and is applied, for example, to securing together two metallic bodies of approximately the same mass, this question of uniformity of heating conditions does not arise at least to a conspicuous extent. In the latter case then the question of the selection of the size, location, and number of the projections which define the separate welds is purely a question of securing the de sired mechanical strength.

X-Q. 34. Your answer does not seem to me to be directly responsive to my question and I will ask you to endeavor to make an answer conforming to the question, will you please try to do so?

A. I endeavored, so far as I could, to answer your question. I intended to have the inference drawn therefrom that so far as this particular feature of De Ferranti's invention is concerned there might be occasions in welding two parts together where in order to secure approximately equal heating the grooves should be made narrower than I show in Figure 3. But I felt that in entire fairness I should point out that when the process is applied to securing together pieces of substantially the same mass, this question of uniformity takes care of itself, and therefore the matter of selection of the size, number and location of the projections is purely a matter of securing the necessary mechanical strength in the joint.

(Objected to as irresponsive.)

X-Q. 35. Would the electrical welding of turbine blades to discs be an occasion of welding two parts together where in order to secure approximately equal heating the grooves could be made proportionately narrower in proportion to the size of the intervening projections than is shown in your drawing, Figure 3?

A. No, I should say not. For instance, my Figure 3 corresponds substantially to Figure 2 of De Ferranti's complete specification and this latter figure illustrates the proportion of grooves and projections used when the turbine blade is to be welded to the carrier. Of course, these proportions might be varied according to the capacity and type of the turbine. This matter is largely a

question of determination, as I have before said, depending upon the special conditions of each case.

X-Q. 36. I assume that your last answer is to be understood as in the negative to the question, am I right?

A. No. Not necessarily. What I mean is that in one turbine construction the proportion shown in my Figure 3 may be correct to secure equal heating effect. In another turbine construction the grooves might be narrower and in the third construction they might be wider.

X-Q. 37. To what differences of turbine construction do you allude in your last answer?

A. Differences in type and capacity. For instance, with a turbine of the Level type having enormously high shaft speeds the conditions are different from turbines of the Curtis type having much lower shaft speeds. A turbine with a small rotor turning at a very high speed presents different conditions from a turbine with a rotor of large diameter and turning at a relatively low speed.

X-Q. 38. How would these differences mentioned by you affect the proportion of width of groove to width of projection in the arrangement shown in your drawing Figure 3.

A. Still having reference to the feature of De Ferranti's invention in which he desires to secure uniformity of heating conditions, the question of varying the size and proportion of the grooves would depend largely upon the relative masses of the blade and carrier as well as the materials of which they are formed. The question of speed bears directly upon the question of mechanical strength, since the centrifugal pull on the blades in the high-speed turbine is very large and the area of the welds would have to be selected to give due mechanical strength to resist the tendency of the blades to fly off. I should therefore say that in turbine construction the proportioning of the grooves would be a matter for separate determination in each case.

X-Q. 39. What is the turbine construction alluded to in your answer 36 in which the grooves might be narrower as stated by you in that answer?

A. I have no particular construction in mind. What I meant was that constructions might be encountered in which a narrowing of the grooves might be desirable.

X-Q. 40. In making your sketch how did you arrive at the proportion of width of grooves and width of projections shown in your Figure 3?

A. I made the sketch from the provisional specification but, as I stated in my direct examination, previous to that time I had seen the drawing of the complete specification. I assume, therefore, that I followed unconsciously the mental impression of Figure 2 of the complete specification.

X-Q. 41. Is there any statement in the provisional specification of Ferranti that the areas of non-union should be made as extensive as possible?

A. Yes, I understand the expression "while at the same time leaving sufficient areas untouched to insure due mechanical strength in the welded joint" to mean precisely this. If De Ferranti had said that at all times the point should have the maximum mechanical strength, I would not get this impression, but when he says that due mechanical strength is all that is required, then it seems to me that this question of due strength is what determines the extent of the isolated welds, and therefore, when two pieces are secured together in which great mechanical strength is not necessary, the areas of non-union will be large.

X-Q. 42. But what about the statement that the objects is "to remove sufficient metal to enable the temperature to rise to the welding point as explained above"? Do you interpret that as an instruction to make the areas of non-union as extensive as possible?

A. No, I interpret that to mean that when the process is to be carried out for welding together two pieces of dissimilar mass sufficient metal is removed from the larger mass as to secure uniformity of heating conditions, the amount of metal removed depending upon the difference between the two masses.

X-Q. 43. Do you find any statement in the De Ferranti provisional specification that the invention is designed for or applicable to securing together of metallic pieces having the same mass?

A. No, I do not find any direct statement to the fact and I have not at any time asserted that there is any such statement in the provisional specification. All that I have asserted is that the method is just as capable of being carried out with objects of the same mass as in the Rietzel patent, which discloses the same method.

X-Q. 44. Would the methods disclosed by the provisional specification as you understand it be just as useful in the welding of pieces of the same mass as in the welding of pieces of a different mass?

A. So far as spot welding is concerned, yes. In this connection I quote from the standard hand book for electrical engineers (McGrow-Hill Book Company, New York), where on page 1728 the statement is made "To overcome the difficulties due to non-uniform temperature distribution, what is known as spot welding has been developed. Spot welding usually consists of punching the surfaces to be welded in such a way that a series of joints of equal and definite area are made between the two, the whole object of the spot weld process is to reduce the welded point to an area of definite and uniform dimensions." The copy of the hand book from which I have read was published in 1915.

(By Mr. Townsend: The reference to the hand book is objected to as incompetent because the author of the statement, whose name appears at the head of the article, cannot be cross-examined, and as immaterial because of the late date of the hand book being 1915.

1660

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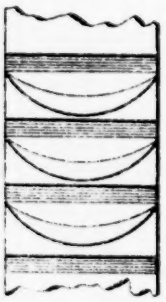
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FILMING

De Ferranti
v.
Harmatta
Interference No. 36709.

De Ferranti Exhibit 1,
Dyer Drawings
P.S.J. A.O.

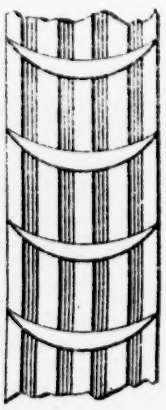
Fig. 1.



"GROOVES MAY BE CUT ACROSS THE EDGE OF THE RING" (L. 20-21)

Fig. 2.





OR SEVERAL GROOVES MAY RUN CIRCUMFERENTIALLY COMPLETELY AROUND THE EDGE" (L. 21-22)

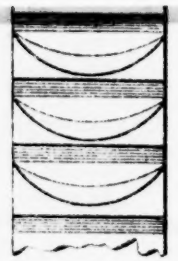
Fig. 3.





"OR, AGAIN, INTERSECTING SETS OF GROOVES INCLINED TO ONE ANOTHER MAY BE CUT ON THE EDGE OF THE RING" (L. 22-23)

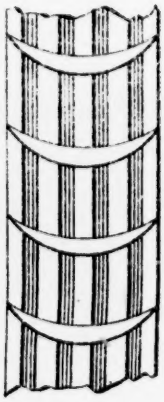
Fig. 1.



"GROOVES MAY BE CUT ACROSS THE EDGE OF THE RING" (L. 20-21)

Fig. 2.





OR SEVERAL GROOVES MAY RUN CIRCUMFERENTIALLY COMPLETELY AROUND THE EDGE" (L. 21-22)

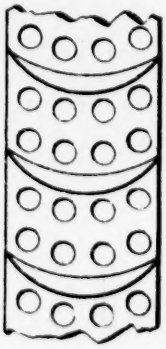
Fig. 3.





"OR, AGAIN, INTERSECTING SETS OF GROOVES INCLINED TO ONE ANOTHER MAY BE CUT ON THE EDGE OF THE RING" (L. 22-23)

Fig. 4.



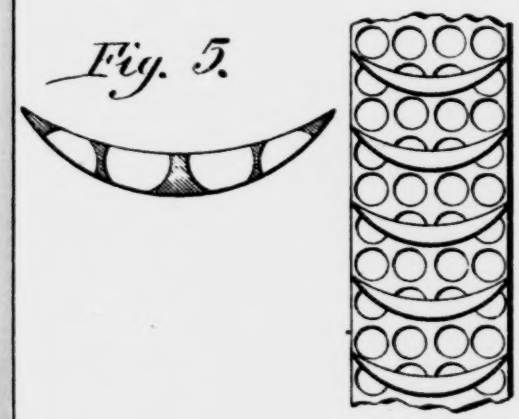
"RADIAL HOLES MAY BE BORED A SHORT DISTANCE INTO THE EDGE, EITHER ARRANGED IN PATTERN, SO AS TO LEAVE INTERVENING PROJECTIONS OF UNTOUCHED METAL TO WHICH THE BLADES MAY BE WELDED" (L. 24-26)

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De Ferranti
v.
Harmatta
} Interference No 36709

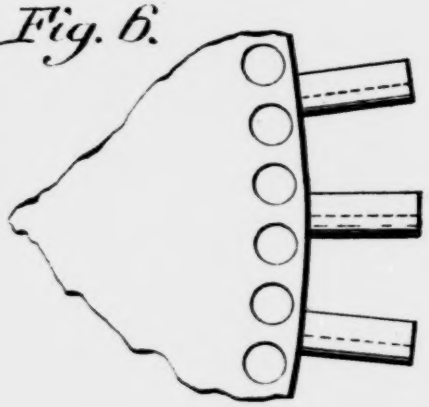
De Ferranti Exhibit 1
Dyer Drawings
B. S. J.
Ex. O.

Fig. 5.



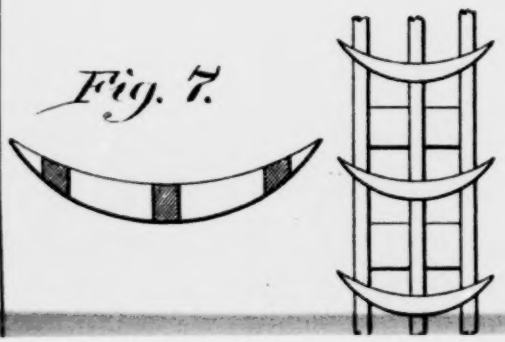
"OR ARRANGED WITHOUT PARTICULAR REFERENCE TO THE POSITION OF THE BLADES" (L. 26-27)

Fig. 6.

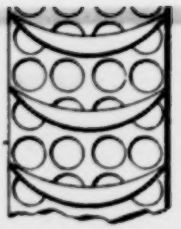


"AGAIN, THE RESULT AIMED AT MAY BE SECURED BY BORING HOLES THROUGH FROM FACE TO FACE OF THE RING AT A RADIUS SLIGHTLY LESS THAN THAT OF ITS OUTSIDE EDGE"
(L. 32-33)

Fig. 7.

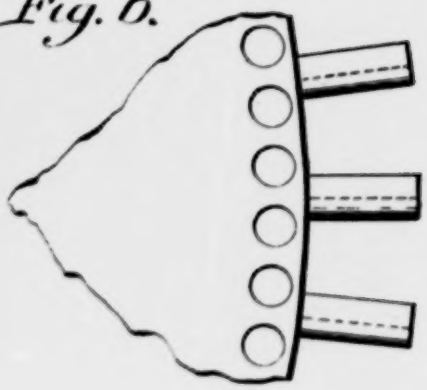


"THE RING MAY BE BUILT UP OF TWO OR MORE THINNER RINGS HELD IN THEIR RELATIVE POSITIONS BY DISTANCE PIECES OR IN ANY OTHER CONVENIENT MANNER, THE BLADES BEING THEN WELDED IN POSITION ON THEIR OUTSIDE EDGES" (L. 34-37)



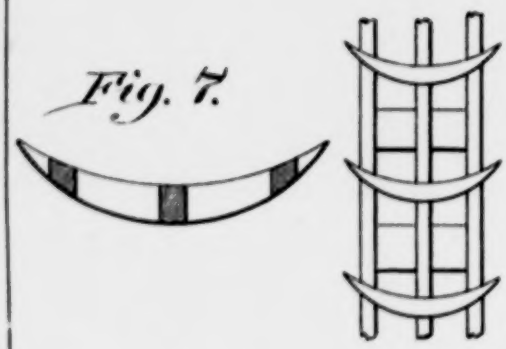
THE BLADES" (L. 26-27)

Fig. 6.



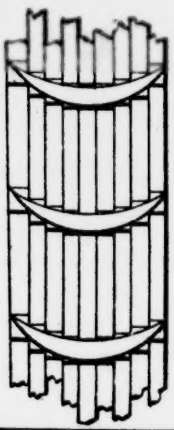
"AGAIN, THE RESULT AIMED AT MAY BE SECURED BY BORING HOLES THROUGH FROM FACE TO FACE OF THE RING AT A RADIUS SLIGHTLY LESS THAN THAT OF ITS OUTSIDE EDGE"
(L. 32-33)

Fig. 7.



"THE RING MAY BE BUILT UP OF TWO OR MORE THINNER RINGS HELD IN THEIR RELATIVE POSITIONS BY DISTANCE PIECES OR IN ANY OTHER CONVENIENT MANNER, THE BLADES BEING THEN WELDED IN POSITION ON THEIR OUTSIDE EDGES" (L. 34-37)

Fig. 8.



"AGAIN, THE RING MAY BE BUILT UP OF A SET OF THIN LAMINAE, THE EDGES OF WHICH ARE NOTCHED, THE LAMINAE BEING ASSEMBLED IN SUCH A WAY THAT THE NOTCHES ARE 'STEPPED' WITH REGARD TO EACH OTHER, THE INTERVENING PROJECTIONS OF METAL THUS FOLLOWING THE SHAPE OF THE TURBINE BLADES TO BE WELDED TO THEM" (L. 38-P. 2 L. 2)



1663

De Ferranti
v.
Harmatta

Interference No. 36709

"De Ferranti Exhibit 2.
Rietzel Patent ".
B. S. J.
N. P.

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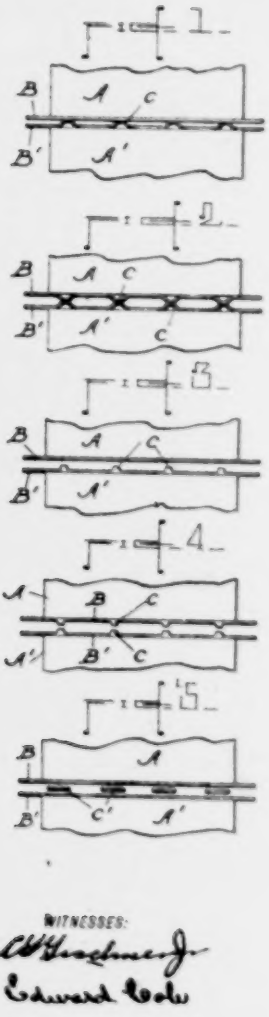
1670

A. F. RIETZEL.

UNITING THE COMPONENT PARTS OF COMPOSITE SHEET METAL STRUCTURES.

APPLICATION FILED FEB. 24, 1905.

928,701. **Patented July 20, 1909.**



WITNESSES:

Edward Cole

INVENTOR

Adolph F. Rietzel.

BY

Fennemore & Decker

ATTORNEYS

UNITED STATES PATENT OFFICE.

ADOLPH F. RIETZEL, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THOMSON ELECTRIC WELDING COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MAINE.

UNITING THE COMPONENT PARTS OF COMPOSITE SHEET-METAL STRUCTURES.

No. 928,701. Specification of Letters Patent. Patented July 20, 1909.

Application filed February 24, 1905. Serial No. 247,061.

To all whom it may concern:

Be it known that I, ADOLPH F. RIETZEL, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, (with post-office address Lynn, Massachusetts,) have invented certain new and useful Improvements in Uniting the Component Parts of Composite Sheet-Metal Structures, of which the following is a specification.

My invention relates to the manner of uniting or fastening two pieces of metal to one another and its object is more particularly to afford a substitute for the manner of uniting pieces of metal as heretofore practiced in the art of electric welding.

As applied to sheet metal manufactures the object is to afford a cheap and practical substitute for riveting and other methods of mechanically securing the two pieces of metal together. As applied to this branch of the metal working arts, the invention affords a means whereby articles of composite sheet metal manufacture may be made up by fastening the pieces of metal constituting the structure with a perfectly secure union and by a process that can be economically conducted.

Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots.

By the terms "weld" and "electric weld", as herein employed, I refer to that process of welding in which the metal is brought to plastic condition by passing an electric current from one to the other of two pieces where they are in contact and is welded while in such condition by the application of pressure, as contra-distinguished from a process of uniting metals, which is described in a patent to Bernardos, No. 363,320, dated May 17, 1887, and in which the union is effected by melting the metal by an arc and which is different from "welding" in the ordinary sense of the term as applied to metal manufactures, in that the metal is heated beyond the point of plasticity and pressure is not employed.

It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces. It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces. A weld formed according to my invention is distinguished however from such prior welds by the fact that the opposed surfaces are welded together in spots only, the heating electric current being localized or confined in any desired way to such spots so that the major portion of the opposed surfaces will not be involved in the welding, although they may, after the completion of the operation, lie in contact with one another or very close together.

My invention is particularly valuable in fastening of pieces of sheet metal together because not only does it limit the amount of electric energy required very considerably as compared with the prior methods of union, but it also diminishes the liability to burning of the metal which is liable to occur when the attempt is made to form a union of two sheets of metal by an electric welding process over substantially the whole area of the meeting or opposed surfaces.

In carrying out my invention any desired number of spots of union may be employed, such number depending obviously upon the extent of the meeting surfaces which are to be fastened together and also upon the strength of the union desired.

In carrying out my invention the localization of the flow of heating electric current and of welding pressure to the desired spot or spots may be brought about in any desired way. One of the preferred ways is by providing between the meeting surfaces or portions of the pieces to be united suitable conducting projections or points at the spots of union, which projections or points carrying the heating electric current from one piece to the other are so located in the meeting surfaces and are so separated from one another that on the application of the weld-

ing pressure the welded union resulting will be localized in the area of the opposed surfaces and will be substantially coextensive in area with the restricted area of the path of the effective heating current. Various ways of providing such points or projections will occur to those skilled in the art.

The preferred method is to indent the metal from the side reverse to that on which the union is effected by a suitable tool, the projections thus formed affording points for the passage of the electric current. This method is preferable also because it permits the welding to be produced at a multiplicity of spots simultaneously through the application of pressure over the whole rear surface of the plate, the points or projections in that case serving not only to localize the flow of the heating current but also to localize the welding pressure.

In the preferred manner of carrying out my invention in the case of sheet metal manufacture I provide projections from the meeting surfaces of both pieces that are to be united. Said projections may also be provided by interposing between the two plane sheets small pieces of conducting material which act in the same manner when the sheets are brought together, as projections which localize the heating current and the pressure. It will be understood, however, that in the latter instance as in the former, these pieces are so small and are placed such a distance apart that on the application of welding pressure there will be no running of the welds into one another but that the final union will be in spots only leaving well-defined areas on the meeting surfaces, in which the surfaces either lie in contact or separated from one another by a very thin space.

From the foregoing it will be seen that my invention is distinguished from prior methods of welding pieces of metal together in that it may be very cheaply practiced, because no attempt is made to weld over the whole of the opposed surfaces of the welded pieces; but on the contrary the union is at a spot or spots only which in ordinary cases will afford as strong a union as would be produced by the riveting of the pieces.

The invention further has the advantage that not nearly so much electric energy is required as is necessary when the electrically welded union extends over the whole area of the opposed surfaces. Moreover, the danger of burning when the attempt is made to weld two sheets of metal together by a lap weld is largely eliminated.

In the accompanying drawings Figures 1, 2, 3, 4 and 5 illustrate some of the ways in which the pieces of metal to be united may be prepared for the welding according to my invention. Figs. 6, 7, 8, and 9 show modifications in the form and disposition of the contact projections which result in the spots of electrically welded union. Fig. 10 shows the assembling of three plates together for welding according to my invention.

In the various figures of the drawing the invention is illustrated as carried out with two sheets of metal B. B'. In Fig. 1, plate B'. only is provided with the distinct or isolated spots (c) or projections for the flow of the electric current, to the plate B, which spots or points may be formed by indenting the plate with a suitable tool. The spots are located so far from one another that on the application of pressure coincidently with the flow of electric current from one plate to the other there will be a number of distinct areas or spots of electrically welded union of the plates separated by well-defined areas on the meeting surfaces in which no union takes place. The resultant is however a fastening of the plates together securely and which is practically as effective as if the attempt were made to form a welded union over the entire areas of the meeting surfaces. Obviously, the greater the distance between the spots the lesser the number that would be used and hence the lesser the consumption of energy in effecting the weld. This is of considerable importance where the meeting areas are large or where a considerable amount of work has to be done. The welding pressure is conveniently applied by conducting-blocks or electrodes, A, A', between which the two pieces B, B', are assembled. These electrodes, A, A', furnish the heating current while applying the pressure, the localization of the pressure in the spots being brought about in this instance by the pointing of the surfaces at point c.

In Fig. 2 both plates are provided with projections the points of which engage with one another, the pointing being produced by indenting the metal sheets from the rear.

Fig. 3 illustrates the localization of the welding by casting projections upon one of the sheets and Fig. 4 by casting projections on both pieces. The localization of the welding in spots might be effected as illustrated in Fig. 5 by interposing small pieces of metal at the spot or spots of desired union, these pieces operating when the plates are brought together in the same way as the projections before referred to. The number and size of the pieces and their distance apart is in this case, as before, so chosen that the application of pressure together with the flow of heating current from one plate to the other will result in a union of the two pieces over their opposed surfaces in spots only thereon.

Fig. 6 shows how the spots might be disposed to fasten the pieces together in distinct spots around their edges.

As shown in Figs. 7 and 8 the projections, instead of being round, might be somewhat elongated and irregularly or symmetrically arranged.

Fig. 9 shows round and somewhat elongated projections combined.

In all these instances however, the union over the surfaces of the plates is confined to spots or areas which are of comparatively small extent as compared with the total area of the meeting surfaces. As will be obvious, the form and disposition of the points or projections of initial contact for flow of the electric current and localization of the pressure may be greatly varied without departing from my invention.

Fig. 10 illustrates the welding of three plates of sheets together when superposed.

My invention is especially useful in the manufacture of articles from sheet metal which are stamped out to different forms, and which have heretofore had their component portions united by riveting or other purely mechanical expedient which is not only expensive but requires generally special tools and results in many cases in an insecure union. When the invention is employed in its preferred form or manner of practice in the field of sheet metal manufacture all that is necessary is to provide the contact spots or projections as already described and then to assemble the pieces in an electric welding machine and weld them together as already set forth.

The product of the foregoing process is readily distinguishable from that produced by melting down the metal of the pieces, from the back at spots as proposed in the before mentioned patent of Bernardos in that there is no substantial alteration of condition of the metal back of the welds appearing as a burning, roughening or disintegration of the material by the very great heat of the electric arc employed for melting down the metal, and by the further fact that the unions themselves in the material of the juxtaposed or opposite faces have the characteristics of a true weld produced by bringing the metal to welding temperature only and applying pressure, so that the pieces are solidly and firmly united and cannot be readily torn apart as they could be if the metal at the spots has been melted down under the high temperature of the electric arc.

The product in the form of sheet metal is further particularly useful for sheet metal ware since the outer or exposed surface of the metal will have the smooth and practically unaltered finish of sheet metal and said surface will not be substantially marred when the process is properly conducted, excepting for the presence of such infrequent small depressions as might remain from the previous indentation of the metal from the back when, as hereinbefore described, an indenting of the metal may be resorted to.

The product in sheet metal also possesses the advantage that the spots of welding when located within the edges of the meeting surfaces will not show. The product is also superior to that produced by riveting of the plates in that there are no rivet heads to mar the finish of the back or outer surfaces of the metal.

What I claim as my invention is:

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

7. The method of welding two pieces of metal together, consisting in superposing said pieces with their surfaces at which the union is to take place superposed or pre-

sented to one another, pressing the pieces together, and passing a heating electric current from one to the other while localizing the heating current simultaneously in a number of distinct or separate spots of limited area, separated from one another sufficiently to secure a union of the pieces in a number of corresponding distinct spots surrounded by and separated from one another by distinct areas in which no union exists.

8. The method of uniting two pieces of metal, consisting in providing between their meeting surfaces a number of projections, spaced apart as described, pressing the pieces together and passing an electric current through said projections while confining the welding area of such current to said projections so as to leave distinct areas around spots in which no welding shall be produced.

9. The method of fastening two plates of metal together at a multiplicity of distinct or separate points of welded union, consisting in providing between them a number of isolated contact spots adapted to pass an electric current from one to the other but so separated that the electric welds will be separated from one another by unwelded areas, passing a heating electric current through such spots simultaneously and applying pressure as and for the purpose described.

10. The herein described method of electrically welding two plates or sheets of metal of any gage together by distinct spots of union disposed over their plane surfaces, consisting in providing a multiplicity of electrical contact spots coincident with the separated spots of union and disposed at such distances apart that there will be well-defined areas between spots through which the electric current will not flow, passing electric current from one plate to the other through said contact spots simultaneously and applying pressure as and for the purpose described.

11. The method of fastening two sheets of metal together, consisting in providing between them a number of isolated contact spots for the passage of the electric welding current, said spots being adapted to initially hold the plates apart and being separated from one another a sufficient distance to confine the welding to distinct areas or isolated spots, passing a heating electric current through a number of said contact spots simultaneously and pressing the plates together as and for the purpose described.

12. The method of fastening two plates of metal together, consisting in furnishing a surface of said plates with a number of projecting contact spots for the passage of welding electric current and disposed at such distances apart that on the application of pressure the welds will not run into one another, superposing said plates, passing a heating electric current from one to the other over said separated spots and applying the pressure to produce a spot-welding of the plates to one another as and for the purpose described.

13. The herein described method of fastening two pieces of metal together by providing each plate with a number of projecting contact spots on its plane surface disposed at such distances apart that the unions will not run into one another but will, nevertheless, firmly hold the plates together, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other through the spots and simultaneously applying pressure thus uniting the plates at a number of distinct points of welded union.

14. The method of uniting two sheets of metal face to face, consisting in indenting the material, superposing the plates with the points of the indentations engaged, passing an electric current from one plate to the other through said points simultaneously, and applying pressure while confining the area of heating to welding temperature to a circumscribed area or spot entirely surrounded by areas unheated to welding temperature to unite the pieces in a distinct spot or spots of small extent in the whole area of the opposed faces.

15. The herein described method of fastening two plates together at a multiplicity of distinct mechanically separated points of welded union, consisting in indenting each plate to form a number of projecting contact spots on the plane surfaces which are to abut, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other thereby forming a number of distinct zones or points of heated metal, heated to welding temperature, and applying pressure to complete the union of plates by a number of mechanically distinct unions.

16. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

Signed at Lynn in the county of Essex and State of Mass. this 7th day of Feb. A. D. 1905.

ADOLPH F. RIETZEL.

Witnesses:

EDWIN W. HAWES.

E. I. FOSTER.

DISCLAIMER.

928,701.—*Adolph F. Rietzel*, Lynn, Mass. UNITING THE COMPONENT PARTS OF COMPOSITE SHEET-METAL STRUCTURES. Patent dated July 20, 1909. Disclaimer filed June 12, 1915, by the assignee, *Thomson Electric Welding Company*.

Enters this disclaimer to that part of the invention described in said patent which is set forth in the specification in the following words:

"Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots"—

except when that process is carried out by the preferred method of providing conducting projections or points between the meeting surfaces of the pieces to be united; and also enters its disclaimer to that part of the claim in the specification which is in the following words:

"1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

"2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

"3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

"4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

"5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

"6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

"16. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

"17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

"18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

"19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

"20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points."—(*Official Gazette, June 22, 1915.*)

2—208.—W. F. 36,709.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

BEFORE THE EXAMINER OF INTERFERENCES.

November 23, 1916.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

SIR:

You are hereby informed that the testimony, and exhibits, in behalf of Sebastian Ziani de Ferranti have been received and filed.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

6—1962

Sebastian Ziani de Ferranti, c/o
Spear, Middleton, Donaldson & Spear,
Victor B'ld'g.,
Washington, D. C.

Docket Clerk.
Nov. 25, 1916.
U. S. Patent Office.

36,709—72.
Application Room.
Nov. 25, 1916.
U. S. Patent Office.

UNITED STATES PATENT OFFICE,

In re Interference:

JOHANN HARMATTA

vs.

SEBASTIAN ZIANI DE FERRANTI.

No. 36,709.

NOTICE OF HEARING ON MOTION TO STRIKE OUT TESTIMONY.

Messrs. Spear, Middleton, Donaldson & Spear,
Attorneys for De Ferranti,
Victor Building, Washington, D. C.

SIRS:

PLEASE TAKE NOTICE that we shall call up the annexed motion for hearing before the Examiner of Interferences on Tuesday, the 28th day of November 1916, at 10 a. m. or as soon thereafter as counsel can be heard.

TOWNSEND & DECKER,
Attorneys for Harmatta.

Due service of the above notice and annexed motion acknowledged this 25 day of Nov 1916.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.

Application Room,
Nov. 25, 1916.
U. S. Patent Office.

UNITED STATES PATENT OFFICE,

In re Interference:

JOHANN HARMATTA

vs.

SEBASTIAN ZIANI DE FERRANTI.

No. 36,709.

MOTION TO STRIKE OUT TESTIMONY.

NOW COMES JOHANN HARMATTA, by his attorneys, and moves to strike out the following portions of the testimony taken

on behalf of De Ferranti on the 10th and 11th days of November 1916, to wit:

All of Q. 6 referring to the Rietzel patent and embraced in the sentence beginning "In this connection you might also consider the disclosure in patent 928,701, Reitzel, July 20th 1909" and ending with the words "disclosure in this Rietzel patent."

All portions of the answer 6 referring to the Rietzel patent and beginning on page 4 of the deposition as filed with the words "Now referring to the Rietzel patent", down to the end of the answer on page 15.

The final sentence ot answer to Q. 7 reading "In point of fact the Rietzel patent" etc.

The offer in evidence of the Rietzel patent if the same is to be taken as a part of the deposition of the witness and as evidence in rebuttal.

All of the answer to X-Q. 44 referring to the Standard Handbook for Electrical Engineers excepting the first sentence of said answer.

The grounds of this motion are those stated by counsel for De Ferranti on the record and upon the general ground that the testimony and portions of the record embraced in the above motion are incompetent as rebuttal testimony taken for De Ferranti.

We also move for a stay of proceedings pending the final determination of this Motion.

JOHANN HARMATTA.
By TOWNSEND & DECKER,
Attorneys.

2—224.—JHD Paper No. 73.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.,
BEFORE THE EXAMINER OF INTERFERENCES.

Nov. 28, 1916.
Mailed " " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

6—1652.

At the request of the parties, the hearing on the motion of Harmatta to strike out certain testimony now noticed for November 28, 1916, is hereby continued to December 4, 1916, at 10 A. M., before the examiner of interferences.

H. E. STAUFFER,
Examiner of Interferences.

2—224.—JHD Paper No. 74.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

BEFORE THE EXAMINER OF INTERFERENCES.

December 4, 1916.
Mailed " " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652.

This case is before me on motion by Harmatta, filed Nov. 25, 1916, to strike out certain of the testimony taken by de Ferranti in rebuttal.

It is quite difficult to satisfactorily pass upon matters of this kind without reading the entire record. There is apparently no sufficient reason why this should be done prior to the final hearing.

Action upon this motion is therefore hereby deferred until the case is presented at final hearing on its merits.

H. E. STAUFFER,
Examiner of Interferences.

Application Room.
Dec. 12, 1915.
U. S. Patent Office.

36,709—75.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

It is hereby stipulated and agreed that the time for the completion of the testimony in rebuttal of de Ferranti be extended to include January 15th, 1917.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

2—224—JHD

Paper No. 76.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

BEFORE THE EXAMINER OF INTERFERENCES.

December 14, 1916.
Mailed " " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed December 12, 1916, is approved, and the times herein are extended as follows:

Rebuttal testimony of de Ferranti to close January 15, 1917.

Final hearing March 20, 1917, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—77.
Jan. 13, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

It is hereby stipulated and agreed that the time for closing the rebuttal evidence by De Ferranti be extended thirty days from the time now set. A cablegram has just been received by the attorneys for De Ferranti to the effect that their British correspondents are pressing to secure the evidence which they consider necessary and vital to this case, but that they are delayed by war conditons. It is believed that this is a sufficient reason for the granting of the extension.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

2—224 IAW Paper No. 78.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

BEFORE THE EXAMINER OF INTERFERENCES.

January 15, 1917.
Mailed " " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652.

The stipulation filed herein January 13, 1917, is approved and times are extended as follows:

Rebuttal testimony of De Ferranti to close Feb. 15, 1917.

Final hearing: April 17, 1917, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—79
Feb. 14, 1917.
U. S. Patent Office

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

It is hereby stipulated and agreed that the time for closing the rebuttal evidence of de Ferranti be extended thirty days from the time now set.

We are as yet without the necessary information from our British correspondents to complete this rebuttal, still delayed by war conditions.

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

2—224—LBF Paper No. 80.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

BEFORE THE EXAMINER OF INTERFERENCES.

February 15, 1917.
Mailed " " "
Interference Division.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
6—1652 *Commissioner of Patents.*

The stipulation filed February 14, 1917, is approved and the times herein are extended as follows:

Rebuttal testimony of De Ferranti to close Mar. 17, 1917.
Final hearing: May 17, 1917, at 11 A. M.

J. W. MILBURN,
Acting Examiner of Interferences.

(Printed Letter Head Omitted)

Docket Clerk, Washington, D. C., February 20th, 1917.
Feb. 21, 1917.
U. S. Patent Office. 36,709—81

Hon. Commissioner of Patents,
Washington, D. C.

SIR:

Please permit Mr. E. M. Kitchen to examine the entire record in De Ferranti vs. Harmatta, Interference No. 36,709.

Respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR

BIB

Defendant's Exhibit No. 33. 693

(Printed Letter Head Omitted)

Docket Clerk,
Mar. 2, 1917.
U. S. Patent Office.

Washington, D. C., March 2nd, 1917.

36,709—82.

Hon. Commissioner of Patents,
Washington, D. C.

SIR:

Please permit Mr. V. A. Fynn to have access to the record in de Ferranti v. Harmatta, No. 36,709.

Very respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for de Ferranti.

HLB
Docket Clerk,
Mar. 19, 1917.
U. S. Patent Office.

36,709—83.
Application Room.
Mar. 19, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

S. Z. DE FERRANTI

vs.

JOHANN HARMATTA.

INTERFERENCE No. 36,709.

STIPULATION.

It is hereby stipulated and agreed that the time for completing the rebuttal evidence on behalf of De Ferranti be extended thirty days. The Attorneys for De Ferranti are still awaiting word from their client with necessary information for the preparation of interrogatories and this information has been delayed, due to the fact that De Ferranti is engaged in Government contracts and has been unable up to the present time to give attention to his personal matters.

Very respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.
TOWNSEND & DECKER,
Attorneys for Harmatta.

694 Defendant's Exhibit No. 33.

2—224—IAW Paper No. 84.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

IN RE INTERFERENCE NO. 36,709.

DE FERRANTI

vs.

HARMATTA.

BEFORE THE EXAMINER OF INTERFERENCES.

March 21, 1917.
Mailed " " "
Interference Division.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

6—1652

The stipulation filed herein March 19, 1917, is approved and times are extended as follows:

Rebuttal testimony of De Ferranti to close Apr. 17, 1917.

Final hearing: June 19, 1917, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences.

(Printed Letter Head Omitted)

Docket Clerk.

Apr. 5, 1917. 36,709—85.

U. S. Patent Office. Washington, D. C., April 4, 1917.

Hon. Commissioner of Patents,
Washington, D. C.

SIR:

Please permit Mr. A. S. Pattison to examine the record in the Interference of de Ferranti v. Harmatta No. 36,709.

Very respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR.

REO

Docket Clerk. 36,709—86
Apr. 16, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

AFFIDAVIT.

City of Washington, District of Columbia, ss:

I, A. G. Sanford, being duly sworn, depose and say that I am a clerk in the employ of Spear, Middleton, Donaldson & Spear, and am of lawful age and that on the 14th day of April, 1917, placed a copy of each of the annexed papers in an envelope addressed to Messrs. Townsend & Decker, 149 Broadway, New York, N. Y., and sent the same by registered mail, as per registered receipt hereto attached.

A. G. SANFORD.

Sworn to and subscribed before me, a Notary Public, this 16th day of April, 1917.

EWD. L. TOLSON,
Notary Public.

(Seal)

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Messrs. Townsend & Decker,
149 Broadway,
New York, N. Y.

GENTLEMEN:

Please take notice that on Tuesday, April 17th, at 10 o'clock in the forenoon, we shall present to the Examiner of Interferences, the attached motion for an extension of the time for taking testimony on behalf of De Ferranti.

Respectfully,
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.

April 14th, 1917.
HLD.

696 Defendant's Exhibit No. 33.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

And now comes De Ferranti, by his Attorneys, and moves for an extension of twenty days (20) of his time for taking rebuttal testimony, and in support of the motion reliance is placed upon the affidavit of James M. Spear, hereto attached.

Respectfully,

SEBASTIAN DE FERRANTI.

By SPEAR, MIDDLETON, DONALDSON & SPEAR,

Attorneys.

April 14th, 1917.
HLD.

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

City of Washington, District of Columbia, ss:

James M. Spear, being duly sworn, deposes and says that he is a member of the firm of Spear, Middleton, Donaldson & Spear, Attorneys for De Ferranti, party to the above entitled interference and has been conversant with the progress of said interference; that promptly after the conclusion of the taking of testimony on behalf of Harmatta deponent's firm proceeded with the matter of the taking of rebuttal evidence on behalf of De Ferranti and to this end deponent's firm corresponded with the English attorneys of Ferranti, from whom the U. S. application was received; that after unavoidable delays and at the earliest possible moment testimony of Mr. Frank L. Dyer, as an expert, was taken on behalf of Ferranti; that it is deemed essential to the interests of De Ferranti that his testimony as inventor, the testimony of Mr. Gerald Stoney, for many years chief assistant to Hon. Charles Parsons, the famous steam turbine inventor, and that of Mr. M. Atkinson Adam, who prepared the original De Ferranti English application as well as the U. S., be taken also in rebuttal; that the testimony,

which these parties will give, will in deponent's opinion be material and necessary to the interests of De Ferranti; that deponent has been informed and believes that it is absolutely impossible for these parties to come to this country to testify; due to war conditions and the fact that they are all engaged in important governmental matters connected with the war; that deponent's firm has been consistently diligent in its efforts to obtain the necessary data from said parties to enable it to prepare the necessary interrogatories to accompany a motion to take testimony abroad; that deponent's firm has only this day received from its English correspondents information for the preparation of interrogatories for the deposition of said M. Atkinson Adam and is informed by the letter accompanying said information that deponent's English correspondent expected to mail in a few days thereafter information for the preparation of interrogatories for the depositions of the said parties De Ferranti, and Stoney; that deponent's firm is informed by its English correspondents and deponent, therefore, believes that it has been absolutely impossible to get this material earlier, due to the fact that said parties Adams, De Ferranti and Stoney, have, as heretofore stated, been engaged in important governmental and munition work, which absolutely precluded their giving proper attention to their private business; that as heretofore stated it is believed that the evidence to be taken is important and material; and that this motion is made in good faith and not for the purposes of delay.

JAMES M. SPEAR.

Subscribed and sworn to before me this 14th day of April, 1917.

(Seal) EDW. L. TOLSON,

April 14th, 1917.

HLD. *Notary Public.*

Docket Clerk. 36,709—87.

Apr. 17, 1917.

U. S. Patent Office.

S. Z. DE FERRANTI

vs.

JOHANN HARMATTA.

INTERFERENCE No. 36,709.

AFFIDAVIT.

City of Washington, District of Columbia, ss:

Bessie I. Bishop, being duly sworn, deposes and says that she is a clerk in the employ of Spear, Middleton, Donaldson & Spear, Attorneys for De Ferranti; that on this 17th day of April 1917, she

enclosed copies of the attached motion paper in an envelope addressed to Messrs. Townsend & Decker, 149 Broadway, New York, N. Y., and sent the same by registered mail, as per the registry receipt hereto attached.

BESSIE I. BISHOP.

Subscribed and sworn to before me this 17th day of April, 1917.

EDW. L. TOLSON.

(Seal) *Notary Public.*

IN THE UNITED STATES PATENT OFFICE

S. Z. DE FERRANTI

vs.

JOHANN HARMATTA.

INTERFERENCE No. 36,709.

Messrs. Townsend & Decker,
149 Broadway, New York, N. Y.

Gentlemen:

Please take notice that on the 20th day of April, 1917, at 10 o'clock in the forenoon, we shall precent to the Examiner of Interferences the attached motion for leave to take testimony abroad in the above entitled interference.

Very respectfully,

SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attys. for De Ferranti.

Service accepted this .. day of April, 1917.

.....
Attys. for Harmatta.

April 17th, 1917.
IMS/HLD.

IN THE UNITED STATES PATENT OFFICE.

S. Z. DE FERRANTI

vs.

JOHANN HARMATTA.

INTERFERENCE No. 36,709.

MOTION.

And now comes De Ferranti, by his attorneys, and moves for permission to take testimony abroad before the U. S. Consul-General in London, England, of the following parties, to wit: Sebastian Z. De Ferranti, Gerald Stoney, and M. Atkinson Adam, all of London, England.

It is expected that these witnesses will each and all rebut the testimony of Herman Lemp, and James H. Gravell, expert witnesses produced on behalf of Harmatta; and specifically that they will establish that the disclosure of the De Ferranti provisional application in Great Britain is a disclosure of spot welding and not merely butt welding as contended by the witnesses produced on behalf of Harmatta, and that they will corroborate the testimony of Frank L. Dyer heretofore taken on behalf of De Ferranti, and that, therefore, they will establish the fact that the disclosure in the said British provisional specification fully supports the issues of the interference, the contrary to which has been alleged by said witnesses produced on behalf of Harmatta.

It is further expected that the witnesses De Ferranti and Adam will testify that De Ferranti produced a weld between the blade and carrier which did not extend over the whole surface of the turbine blade, but on the contrary as welded at isolated spots only of their juxtaposed surfaces.

It is further expected that the witnesses will clearly differentiate the disclosure in the De Ferranti English Provisional specification from the prior art discussed by the witnesses produced on behalf of Harmatta and refute the assertions made by said witnesses Lemp and Gravell as to the identity of such disclosure of De Ferranti with the prior art.

It is further expected that the witness Stoney will produce sketches made by him from the disclosure of the De Ferranti Provisional specification only, and will explain how and why this is spot welding as distinguished from butt welding.

It is further expected that the witnesses each and all will testify that the welding of the blades in isolated spots only of their juxtaposed surfaces is not inconsistent with the requirements of "due mechanical strength" mentioned in said Provisional specification, as asserted by the witnesses produced on behalf of Harmatta and will give their reasons therefor.

Respectfully,

S. Z. De Ferranti.

By Spear, Middleton, Donaldson & Spear,
Attorneys

April 16th, 1917.
JHS/HLD.

700 Defendant's Exhibit No. 33.

IN THE UNITED STATES PATENT OFFICE.

S. Z. DE FERRANTI

vs.

JOHANN HARMATTA.

INTERFERENCE No. 36,709.

AFFIDAVIT.

City of Washington, District of Columbia, ss:

James M. Spear, being duly sworn, deposes and says that he is a member of the firm of Spear, Middleton, Donaldson & Spear, attorneys of record for De Ferranti in the above entitled interference; that the present motion for leave to take testimony abroad is made in good faith, and not for the purposes of delay, or of vexing or harassing the opposing party to the case; that the said motion gives the names of the witnesses and the facts to which each is expected to testify, and deponent believes the witnesses will so testify by reason of information to this effect received by his firm from said parties; that deponent believes said testimony to be material and competent and necessary to the end of justice; that it cannot be taken here without hardship to the moving party greatly exceeding that to which the opposing party will be exposed by the taking of the testimony abroad and in fact cannot be taken at all here, as said parties cannot leave England, due to their employment by the government or important munition and governmental work connected with the war; and that witnesses cannot be secured in this country to take their place, Mr. De Ferranti being the inventor and necessarily an important witness, Mr. Adam being the English attorney to whom his original disclosure was made, and Mr. Stoney being a particularly important witness by reason of his relations with Mr. Parsons, the great steam turbine inventor, and by reason of his long and extensive experience in both the turbine and electric welding arts.

JAMES M. SPEAR.

Sworn to and subscribed before me this 16th day of April, 1917.
(Seal) EDW. L. TOLSON,
JMS/HLD. *Notary Public.*

Receipt for Registered Article No. 191,861. Class postage 1.
Washington (F Street Sta.) D. C. Registered Apr. 17, 1917.
Postmaster, Per Proctor.

Docket Clerk
Apr. 20, 1917.
U. S. Patent Office.

36,709—88.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

BRIEF FOR HARMATTA IN OPPOSITION TO THE MOTION OF DE FERRANTI FOR LEAVE TO TAKE TESTIMONY ABROAD.

This is a motion brought by de Ferranti under Rule 158 for leave to take testimony in London, England.

The showing of the accompanying motion is insufficient to warrant the granting of the same. As to the requirements specified in Clause (a) of the Rule the motion sets forth no sufficient grounds on which is based the belief that the witnesses will testify in the manner set forth in the motion. All that is said is that the deponent Spear believes the witnesses will so testify by reason of information to this effect received by his firm from said parties.

As to the requirements of Clause (b) of the Rule, there is no showing of facts from which it can be concluded that the testimony cannot be taken in this country at all or that it cannot be taken here without hardship and injury to the moving party greatly exceeding that to which the party Harmatta would be exposed by the taking of such testimony abroad. In place of such showing of facts the motion paper substitutes a mere statement of James M. Spear that he believes that the parties whose testimony it is desired to take cannot leave England. As to the matter of comparative hardship no showing seems to be made whatever.

Upon the general merits of the motion we call attention to the fact that the evidence which it is desired to take is simply in the nature of expert or opinion evidence of persons residing abroad to be adduced in rebuttal of expert or opinion evidence given on behalf of Harmatta in this country and by witnesses residing in this country.

The aid of Rule 158 is thus invoked by de Ferranti for a purpose entirely foreign to the intent of said Rule. This Rule was the outgrowth of the decision of Commissioner Paine in the case of Laurer vs. Crowell, et al., C. D. 1879, page 177. That case and many subsequent cases, among them Parkin & Wright vs. Jenness, C. D. 1893, page 64; Smith vs. Barger, C. D. 1875, page 1; Green

vs. Hall vs. Siemens vs. Fields, C. D. 1889, page 110, show clearly that the only purpose of this Rule was to permit testimony to be taken abroad as to foreign publications or patents by which a date of invention under the Patent Statutes could be established, or for the purpose of showing some one of the contestants is not the original inventor. It was never intended by this Rule to put it into the power of a contestant in the United States Patent Office to go abroad for expert or opinion evidence, certainly not in the case of so widely known an art as that involved in the present controversy and, under the protection of said Rule, to subject his opponent to the recognized hardship and disadvantage of having to meet the case prepared in advance abroad and to cross-examine witnesses on a case so prepared under the disadvantages of the procedure now invoked.

It is unbelievable that witnesses competent to give expert and opinion evidence upon the subjects of electric welding and turbine construction do not exist in this country and there is no more reason for taking expert and opinion evidence abroad in this case than there would be in any of the numerous cases coming before the Patent Office for adjudication and wherein evidence of that nature can be properly used. To permit the Rule 158 to be used for any such purpose as is here proposed would open the door to contestants to gravely harrass opponents and should not be permitted in any case and certainly not in a case such as the present and upon any such showing as is herein made.

As to the particular witnesses which it is proposed to call and the particular nature of their testimony, it may be said that what the writer of the provisional specification may think that he meant or may now say that he meant is not competent or material evidence to establish what the specification actually means as a publication and disclosure to the ordinary reader of the same. Anything that the writer might say as to the meaning of the specification to a third party reading the same is no more competent or material than would be the evidence of anyone of thousands of specification writers in this country.

Indeed the testimony of the attorney would be of much less weight and importance than that of some other person because his testimony would be tinged by the fact that he wrote the specification and may have had certain ideas in mind which were not expressed in a way to disclose the thought.

That de Ferranti produced a weld in the manner claimed in the motion would not be competent or material testimony as it would be simply evidence of what the inventor did abroad and would not support the claim of disclosure by patent or publication. The remaining testimony which it is proposed to take is clearly in the nature of expert or opinion evidence which could just as well be taken in this country.

As to Mr. de Ferranti, any testimony that he may give as to the nature of the disclosure made by the publication can borrow no effect or value from the fact that he is the alleged inventor.

As to Mr. Adam, the fact that he was attorney for Mr. de Ferranti similarly can give no weight or effect to testimony as to the nature of the disclosure beyond what would attach to the testimony of any other patent attorney and as before stated would be even of less weight. It does not appear even that Mr. Adam is possessed of special expert knowledge but even if he were expert in the art to which the invention relates, that fact establishes no warrant for the taking of testimony of the nature proposed abroad.

The expert opinion evidence which it is desired to produce through Mr. Stoney is of the same nature which anyone of numerous experts in this country would be able to give did the facts warrant it.

The rule permitting testimony to be taken in foreign countries was only framed to meet exceptional cases in which it was necessary to prove the facts of invention by witnesses residing abroad and with whom sole knowledge of the facts necessarily lay. It was not framed to permit a party to an interference to select witnesses living abroad in preferenc to witnesses living in this country to give expert opinion evidence and then to say that because the witnesses live abroad he should be premitted to produce their evidence under the Rule 158 in preference to evidence of the same nature which could be as well obtained in this country.

Respectfully submitted,
TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, April 19th, 1917.

Docket Clerk. 36,709—89
April 17, 1917.
U. S. Patent Office.
Mail Room.
April 17, 1917.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

MOTION ON BEHALF OF DE FERRANTI FOR EXTENSION OF TIME TO TAKE REBUTTAL TESTIMONY.

BRIEF FOR HARMATTA.

It appears from the affidavit of James M. Spear attached to the motion papers that further time is desired by de Ferranti in order

that testimony may be taken abroad. The motion seems to proceed upon the assumption that leave has been or will be granted pursuant to Rule 158 of the Rules of Practice permitting testimony to be taken in foreign countries upon the showing the precise character of which is fully set forth in the Rule. No such showing and motion have been made and granted and until the granting of such a motion the filing of interrogatories is not permitted. As stated in Raffard vs. de Ferranti, 60 O. G. 439:

> "Rule 158, under which a suitor before this Office may secure and introduce evidence taken in foreign countries, is precise in its terms and points out a definite and specific mode of procedure. It directs that after a petitioner has presented his motion and secured permission to take such testimony interrogatories must be filed within a limited time, and cross-interrogatories, also, if the opposing party shall elect to question the witness. This is the natural and prescribed way of proceeding under the rule; but it is definitely provided that this procedure may be waived to the extent of permitting an oral examination *by stipulation of the parties*. There can be no doubt as to the meaning of this, and there is no question that a party seeking the protection of the rule is entitled to all the privileges which it guarantees in terms. Plainly, nothing short of the mutual assent of all the interested parties can avoid its strict letter."

In view of the status of the present case and the long time that has elapsed since Harmatta completed his testimony, it is submitted that further time should be granted to de Ferranti only for the express purpose of permitting him to bring a motion under Rule 158. If, and only when such motion is granted can the motion for further time to take testimony be properly entertained. It is submitted that any extension of Ferranti's time should be made conditional upon his promptly bringing and prosecuting a motion under Rule 158.

Respectfully,
TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, April 16th, 1917.

LBF 2—224 Paper No. 90.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

April 28, 1917.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

THOMAS EWING,

6—1652 *Commissioner of Patents.*

This case is before me for consideration of the following motions by De Ferranti:

1. A motion for permission to take testimony abroad, filed April 17, 1917.

2. A motion for an extension of time in which to take rebuttal testimony, filed April 16, 1917.

Motion to Take Testimony Abroad: The testimony which the moving party intends to take, should this motion be granted, is said to consist entirely of the depositions of De Ferranti himself, the patent attorney who prepared the specification for his British application, and a single other witness, expert in the art to which the invention relates. The avowed purpose of all this testimony is to explain the meaning or intended meaning of the disclosure in the provisional specification forming a part of the British patent relied upon by De Ferranti as a constructive reduction to practice of the invention and to demonstrate how said disclosure differs from the prior art and corresponds to the process defined in the issue herein. By this means De Ferranti seeks to rebut attacks upon his British patent by certain experts who, testifying on behalf of his opponent, expressed the opinion that the De Ferranti British provisional specification relates to a method of welding distinctly different from that in issue, and which method was old in the art at the time the provisional specification was filed.

The necessity for taking the testimony of the proposed witnesses is not apparent. Statements by De Ferranti or his former attorney as to what De Ferranti intended to disclose in his provisional specification would, of course, have no value. The specification must speak for itself. Nor would it seem to be necessary to go abroad for expert testimony which presumably could be obtained in this country. As a matter of fact De Ferranti has already taken and filed the testimony of one expert covering the very matters concerning which he desires to take further expert testimony abroad. Testimony of the sort proposed is, moreover, of doubtful value in the determination of the question to which it is directed, namely, the sufficiency of the provisional specification of De Ferranti's British patent as a disclosure of the invention. The testimony of experts as to the meaning of the issue or in explanation of the contents of an application is ordinarily not desired or permitted (Ricketts vs. Ambruster & Beck, 144 O. G., 276; Von Keller vs. Hayden vs. Kruh vs. Jackson, 173 O. G., 285; Cooper vs. Downing, 222 O. G., 727). Whether or not the aforesaid provisional specification discloses the invention can apparently be determined from a consideration of the specification itself, without the aid of testimony. If De Ferranti considers that the testimony taken by Harmatta is improper, his course would seem to be to attempt to secure its suppression. Or, if he prefers to let such testimony stand and to endeavor to rebut it, his efforts in that direction would not apparently be prejudiced or unduly restricted by confining his rebuttal testimony to the depositions of experts in this country, of which he has in fact already availed himself. The showing does not require or justify the taking of testimony abroad, as proposed in the motion.

Motion to Extend Time: This motion asks that De Ferranti's rebuttal time be extended to cover the taking of rebuttal testimony abroad, as set out in his other motion. The showing in support of the extension relates only to the additional time necessary for the taking of such testimony. Inasmuch as De Ferranti will not be permitted to take testimony abroad, no reason is advanced that would render an extension of time necessary.

The motion to take testimony abroad is denied.

The motion to extend time for rebuttal testimony is denied.

Limit of appeal from denial of motion to take testimony: May 7, 1917.

The taking of testimony is suspended.

H. E. STAUFFER.

Application Room. Intf. No. 36,709. Paper No. 91.
May 2, 1917.
U. S. Patent Office.
Docket Clerk.
May 3, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

S. Z. DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

APPEAL.

Appeal is hereby taken to the Honorable Commissioner of Patents from the decision of the Examiner of Interferences denying the motion for permission to take testimony abroad and for an extension of time in which to take rebuttal testimony. In support of the motion it is alleged that the Examiner erred in holding that the necessity for taking the testimony of the proposed witnesses is not apparent; that he erred in holding that statements by De Ferranti or his former Attorney would not have any value; that he erred in not holding that in view of the fact that this invention was made abroad and the further fact that the affidavit supporting the motion shows the proposed witnesses to have had long experience and special knowledge in this particular art would make their evidence material and important and of a character that would not be procured in this country; that he erred in not granting the motion for permission to take testimony abroad and finally that he erred in not granting an extension of time in which to take such rebuttal testimony.

Respectfully,
S. Z. DE FERRANTI.

By SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys.

May 1, 1917.
JMS/BIB

1709

708 Defendant's Exhibit No. 33.

EEG 2—201 Paper No. 92.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON,

May 4, 1917.

SIR:

The case of

DE FERRANTI

vs.

HARMATTA.

APPEAL ON MOTION.

Intf. No. 36,709 will be heard by the Commissioner on the 25th day of May, 1917.

The hearings will commence at ten o'clock, and as soon as the argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;

Motions, thirty minutes, each side;

Interference appeals, final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in interference cases, and in such case a full and fair opening must be made.

Briefs in interference appeals must be filed in accordance with the provisions of Rule 144.

Respectfully,
THOMAS EWING,
Commissioner of Patents.

To S. Z. De Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.

To J. Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Docket Clerk.
May 25, 1917.
U. S. Patent Office.

Intf. No. 36,709. Paper No 93.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE COMMISSIONER OF PATENTS

ON APPEAL BY DE FERRANTI.

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE NO. 36,709.

BRIEF FOR HARMATTA IN OPPOSITION.

De Ferranti's appeal is taken from the decision of the Examiner of Interferences rendered April 28th 1917 refusing to grant de Ferranti's motion filed April 17th 1917, under Rule 158, for leave to take testimony in London, England.

The brief filed by the party Harmatta in opposition to the grant of that motion and filed at the hearing before the Examiner of Interferences fully sets forth the party Harmatta's reasons as to why the motion should not be granted, said arguments being substantially reproduced herein.

The showing of the motion is insufficient to warrant the granting of the same. As to the requirements specified in Clause (a) of the Rule the motion sets forth no sufficient grounds on which is based the belief that the witnesses will testify in the manner set forth in the motion. All that is said is that the deponent Spear believes the witnesses will so testify by reason of information to this effect received by his firm from said parties.

As to the requirements of Clause (b) of the Rule, there is no showing of facts from which it can be concluded that the testimony cannot be taken in this country at all or that it cannot be taken here without hardship and injury to the moving party greatly exceeding that to which the party Harmatta would be exposed by the taking of such testimony abroad. In place of such showing of facts the motion paper substitutes a mere statement of James M. Spear that he believes that the parties whose testimony it is desired to take cannot leave England. As to the matter of comparative hardship no showing seems to be made whatever.

Upon the general merits of the motion we call attention to the fact that the evidence which it is desired to take is simply in the nature of expert or opinion evidence of persons residing abroad to be adduced in rebuttal of expert or opinion evidence given on behalf of Harmatta in this country and by witnesses residing in this country.

The aid of Rule 158 is thus invoked by de Ferranti for a purpose entirely foreign to the intent of said Rule. This Rule was the

outgrowth of the decision of Commissioner Paine in the case of Lauder vs. Crowell, et al., C. D. 1879, page 177. That case and many subsequent cases, among them Parkin & Wright vs. Jenness, C. D. 1893, page 64; Smith vs. Barker, C. D. 1875, page 1; Green vs. Hall vs. Siemens vs. Fields, C. D. 1889, page 110, show clearly that the only purpose of this Rule was to permit testimony to be taken abroad as to foreign publications or patents by which a date of invention under the Patent Statutes could be established, or for the purpose of showing some one of the contestants is not the original inventor. It was never intended by this Rule to put it into the power of a contestant in the United States Patent Office to go abroad for expert or opinion evidence, certainly not in the case of so widely known an art as that involved in the present controversy and, under the protection of said Rule, to subject his opponent to the recognized hardship and disadvantage of having to meet the case prepared in advance abroad and to cross-examine witnesses on a case so prepared under the disadvantages of the procedure now invoked.

It is unbelievable that witnesses to give expert and opinion evidence upon the subjects of electric welding and turbine construction do not exist in this country and there is no more reason for taking expert and opinion evidence abroad in this case than there would be in any of the numerous cases coming before the Patent Office for adjudication and wherein evidence of that nature can be properly used. To permit the Rule 158 to be used for any such purpose as is there proposed would open the door to contestants to gravely harrass opponents and should not be permitted in any case and clearly not in a case such as the present and upon any such showing as is herein made.

As to the particular witnesses which it is proposed to call and the particular nature of their testimony, it may be said that what the writer of the provisional specification may think that he meant or may now say that he meant is not competent or material evidence to establish what the specification actually means as a publication and disclosure to the ordinary reader of the same. Anything that the writer might say as to the meaning of the specification to a third party reading the same is no more competent or material than would be the evidence of anyone of thousands of specification writers in this country.

Indeed the testimony of the attorney would be of much less weight and importance than that of some other person because his testimony would be tinged by the fact that he wrote the specification and may have had certain ideas in mind which were not expressed in a way to disclose the thought.

That de Ferranti produced a weld in the manner claimed in the motion would not be competent or material testimony as it would be simply evidence of what the inventor did abroad and would not support the claim of disclosure by patent or publication. The remaining testimony which it is proposed to take is clearly in the na-

ture of expert or opinion evidence which could just as well be taken in this country.

As to Mr. de Ferranti, any testimony that he may give as to the nature of the disclosure made by the publication can borrow no effect or value from the fact that he is the alleged inventor.

As to Mr. Adam, the fact that he was attorney for Mr. de Ferranti similarly can give no weight or effect to testimony as to the nature of the disclosure beyond what would attach to the testimony of any other patent attorney and as before stated would be even of less weight. It does not appear even that Mr. Adam is possessed of special expert knowledge but even if he were expert in the art to which the invention relates, that fact establishes no warrant for the taking of testimony of the nature proposed abroad.

The expert opinion evidence which it is desired to produce through Mr. Stoney is of the same nature which anyone of numerous experts in this country would be able to give did the facts warrant it.

The rule permitting testimony to be taken in foreign countries was only framed to meet exceptional cases in which it was necessary to prove the facts of invention by witnesses residing abroad and with whom sole knowledge of the facts necessarily lay. It was not framed to permit a party to an interference to select witnesses living abroad in preference to witnesses living in this country to give expert opinion evidence and then to say that because the witnesses live abroad he should be permitted to produce their evidenc under the Rule 158 in preference to evidence of the same nature which could be as well obtained in this country.

It is therefore contended that the Examiner was right in his decision in denying the motion and that the present appeal should also be denied.

Respectfully submitted,

TOWNSEND & DECKER,
Attorneys for Harmatta.

New York, May 24th, 1917.

Recorded Vol. 123, p. 97. Intf. No. 36,709. Paper No. 94.
Hearing: May 25, 1917. SET

IN THE UNITED STATES PATENT OFFICE.

DE FERRANTI

vs.

HARMATTA.

PATENT INTERFERENCE No. 36,709.

APPEAL ON MOTION.

ELECTRIC WELDING.

Application of Sebastian Z. de Ferranti filed Dec. 29, 1911, No. 668,464, division of application filed May 14, 1904.

712 Defendant's Exhibit No. 33.

Patent granted Johann Harmatta Dec. 3, 1912, No. 1,046,066, on application filed Dec. 3, 1903.

MESSRS. SPEAR, MIDDLETON, DONALDSON & SPEAR, for de Ferranti.

MESSRS. TOWNSEND & DECKER for Harmatta.

This is an appeal by de Ferranti from the decision of the examiner of interferences denying his motion to take testimony abroad.

It appears that de Ferranti relies upon a British application and that in his testimony in chief a copy of this application was introduced in evidence, and that thereafter testimony was taken on behalf of Harmatta for the purpose of showing that the invention in issue is not disclosed in the British provision specification. Permission was then sought to take the testimony of de Ferranti, Stoney, and Adam, it being stated that it was expected to prove by de Ferranti and Adam that de Ferranti had actually produced a weld between the blade and the carrier which did not extend over the whole surface of the turbine blade, and that the welding of the blades in isolated spots is not inconsistent with the requirement of "due mechanical strength" mentioned in the provisional specification, and that the witness Stoney would produce sketches made by him from the disclosure of the de Ferranti provisional specification only, and explain how and why this is spot welding as distinguished from blade welding.

At the hearing on this appeal the motion was withdrawn in so far as it asked to take the testimony of Adam, who is the English attorney to whom de Ferranti's original disclosure is said to have been made.

No error is found in the holding of the examiner of interferences denying the motion. Any work done by de Ferranti in England is immaterial to the question of priority. The question for consideration is what the original specification discloses. It is not seen that the fact that de Ferrant may have made welds in a certain way in any way establishes that that method is disclosed in the provisional specification. De Ferranti has already introduced the testimony of an expert in support of his contention that the invention is disclosed in the provisional specification, and it would seem that if any other further expert testimony was necessary, it could have been obtained from an expert in this country.

The decision of the examiner of interferences is affirmed.

R. F. WHITEHEAD,
First Assistant Commissioner.

May 29, 1917.

Defendant's Exhibit No. 33. 713

EEG Letter No. 95.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

May 29, 1917.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

APPEAL ON MOTION.

Sir:

Please find enclosed herewith a copy of a decision of the First Assistant Commissioner, dated May 29, 1917, in the above entitled case.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

F.

S. Z. de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
Washington, D. C.

J. Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

LBF 2—224 Paper No. 96.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 7, 1917
Mailed " " "
Interference Division

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI
vs.
HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
THOMAS EWING,
Commissioner of Patents.

6—1652

Proceedings are resumed in the above entitled case and the time for final hearing is set for August 7, 1917, at 11 A. M.

H. E. STAUFFER,
Examiner of Interferences

FOR PAPER NO. 97 SEE INDEX.

W. F. 2—208. 36,709—98.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON,

June 29, 1917.

BEFORE THE EXAMINER OF INTERFERENCES.

In the Matter of the Interference of

DE FERRANTI
vs.
HARMATTA.

No. 36,709.

Sir:

You are hereby informed that the printed record in behalf of Sebastian Ziani de Ferranti has been received and filed.

By direction of the Commissioner:

Very respectfully,
W. F. WOOLARD,
Chief Clerk.

6—1962.

Sebastian Ziani de Ferranti,
c/o Spear, Middleton, Donaldson & Spear,
[illegible] Bldg., Washington, D. C.

Docket Clerk. 36,709—99.
July 7, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

S. Z. De Ferranti

vs.

Johann Harmatta.

Interference No. 36,709.

Stipulation.

It is hereby stipulated by and between the parties hereto that the hearing before the Honorable Examiner of Interferences be postponed for approximately one month.

Spear, Middleton, Donaldson & Spear,
Attorneys for S. Z. De Ferranti.
Townsend & Decker,
Attorneys for Johann Harmatta.

July 3rd, 1917.
WFH/HLD.

JHD 2—224 Paper No. 100.

Department of the Interior,

UNITED STATES PATENT OFFICE.

Washington, D. C.,

July 9, 1917.
Mailed " " "
Interference Division.

Before the Examiner of Interferences.

In re Interference No. 36,709.

De Ferranti

vs.

Harmatta.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
Thomas Ewing,
Commissioner of Patents.

6—1652

The stipulation filed July 7, 1917, is approved, and in accordance with the provisions thereof, the time for final hearing in this case is extended to September 7, 1917, at 11 A. M.

H. E. Stauffer,
Examiner of Interferences.

FOR PAPER NO. 101 SEE INDEX.

716 Defendant's Exhibit No. 33.

W. F. 2—208 36,709—102.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

July 13, 1917.

BEFORE THE EXAMINER OF INTERFERENCES.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

No. 36,709.

Sir:

You are hereby informed that the printed record in behalf of Johann Harmatta has been received and filed.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,

Chief Clerk.

6—1962

Johann Harmatta,
c/o Townsend & Decker,
149 Broadway, New York, N. Y.

EEG 36,709. Letter No. 103.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

July 19, 1917.

In the Matter of the Interference of

DE FERRANTI

vs.

HARMATTA.

INTERFERENCE No. 36,709.

Sir:

It is noted that Melville Church, of Washington, D. C., has been appointed associate attorney for Spear, Middleton, Donaldson & Spear, in the above entitled case.

Very respectfully,

W. F. WOOLARD,

Chief Clerk.

J.

J. Harmatta,
c/o Townsend & Decker,
149 Broadway, New York City.

Mail Room. 36,709—104.
July 24, 1917.
U. S. Patent Office.

Docket Clerk.
July 24, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re: Interference

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

New York, July 19th, 1917.

Messrs. Spear, Middleton, Donaldson & Spear,
Victor Building, Washington, D. C.

Sirs:

PLEASE TAKE NOTICE that on Thursday, the 26th day of July, 1917, at 10 o'clock a. m., or as soon thereafter as counsel may be heard, before the Examiner of Interferences, we shall present the accompanying motion for judgment in favor of Harmatta in the above-entitled interference for his determination and shall also move for a stay of proceedings pending the final determination of said motion.

TOWNSEND & DECKER.
Attorneys for Harmatta.

Due service acknowledged this 20th day of July, 1917
SPEAR, MIDDLETON, DONALDSON & SPEAR,
Attorneys for De Ferranti.

Docket Clerk.
July 24, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE

BEFORE THE EXAMINER OF INTERFERENCES.

In re: Interference

SEBASTIAN ZIANI DE FERRANTI

vs.

JOHANN HARMATTA.

No. 36,709.

MOTION FOR JUDGMENT.

NOW COMES JOHANN HARMATTA by his duly authorized attorneys and moves that judgment on the ex parte records of the parties hereto and in view of the Rietzel patent No. 928,701,

one Rietzel, No. 928,701, and the decisions of the Court of Appeals of the District of Columbia in *in re* Fritts, 227, O. G., 742, and Rowntree vs. Sloan, 227 O. G., 744.

Reference to the file shows that the final hearing on the merits is now set for September 7, 1917. All the testimony has been taken and the printed records of the respective parties are on file. It would in my judgment be clearly better to have this question raised at the time fixed for the final hearing on the merits, at which time all grounds for decision may be properly presented and discussed.

The motion is denied with the right to renew the same at the final hearing.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 36,709—107.
August 21, 1917.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

INTERFERENCE No. 36,709.

DE FERRANTI

vs.

HARMATTA.

("M" in margin.)

It is hereby stipulated and agreed that the final hearing in the above entitled case be postponed to October 15th 1917 or as soon thereafter as convenient to be set. This postponement is requested particularly by counsel for de Ferranti in view of engagements on Court cases which will take the entire month of September.

TOWNSEND & DECKER,
Attorneys for Harmatta.
SPEAR, MIDDLETON, DONALDSON & SPEAR.
Attorneys for De Ferranti.

IAW 2—224. Paper No. 108.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

August 28, 1917.
U. S. Patent Office,
Interference Division.
Aug. 28, 1917, Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 36,709.

DE FERRANTI
vs.
HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
R. F. WHITEHEAD,
6—1652 *Acting Commisioner of Patents.*

The stipulation filed herein August 21, 1917, is approved and in accordance therewith the time for final hearing is hereby continued to October 16, 1917, at 11 A. M.

J. W. MILBURN,
Acting Examiner of Interferences.

DE FERRANTI
vs.
HARMATTA.

1.	Oct. 7, 1913	Declaration. Statements due Dec. 1/13.
2.	Nov. 8, "	Registry return receipt.
3.	" 26, "	Statement of Harmatta
4.	" " "	Letter to "
5.	" " "	Statement of de Ferranti
6.	" 28, "	Letter to "
7.	Dec. 5, "	Testimony set— F. H. June 23/14.
8.	" 11, "	Power of Atty of Assignee of Patentee Harmatta
9.	" 12, "	Notice of Change of Atty
10.	" 31, "	Petition by Harmatta for certified of Appln. of de Ferranti S. No. 208,034

11.	Jan. 2, "	Notice of hearing.
12.	Jan. 3, 1914	Stipulation to extend time for Motions
13.	" 5, "	Times extended. F. H. July 20/14.
14.	" 31/14	Stipulation to extend time for Motions
15.	Feb. 2, "	Commr's decision
16.	" " "	Notice of "
17.	" 3/14	Times extended. F. H Aug. 19/14.
18.	Feb. 27/14	Stipulation to extend time for Motions
19.	Feb. 28/14	Times extended. F. H. Sept. 22, 1914.
20.	Mch. 31/14	Stipulation to extend time for Motions
21.	Apr. 1/14	Times extended. F. H. Oct. 21/14.
22.	May 4/14	Motion to dissolve by Harmatta
23.	" 6, "	Motion to dissolve by Harmatta denied transmission. L. A. May 16/14. Test'y susp'd.
24.	" 16 "	Appeal by Harmatta on Motion
25.	" " "	Notice of hearing
26.	" 28, "	Brief for Harmatta
27.	June 5, "	Commr's decision
28	" " "	Notice of "
29.	" 9, "	Proceedings resumed. Testy reset. F. H. Nov. 25/14
30.	" 10/14	Amended Motion to dissolve by Harmatta.
31.	June 18/14	Amended motion to dissolve by Harmatta transmitted Test'y susp'd.
32.	" 19, "	Notice of hrg by Law Exr
33.	July 16/14	Stipulation to extend time for hrg on Motion
34.	" 21/14	Notice of Hy'g. by Law Exr.
35.	Aug. 26/14	Stipulation to postpone hrg by Law Exr
36.	" 27, "	Notice of Change of Hrg. by Law Exr
37	Sept. 29/14	Stipulation to postpone hearing by Law Examiner
38.	" 30, "	Notice of postponement of hrg by Law Exr
39.	Nov. 12/14	Brief for de Ferranti
40.	Dec 1/14	Decision of Law Examiner No. L. A.
41.	" " "	Notice of decision
42.	" 3/14	Proceedings resumed. Testy reset. F. H. May 18/15.
43.	" 12, "	Motion for Rehrg by Law Exr by Harmatta
44.	" 15, "	Decision of Law Ex'r Rehrg denied
45.	" " "	Notice of Decision
46.	Jan. 26/15	Stipulation to extend time for testy
47.	" 27/15	Times extended. F. H. June 16/15.
48.	Mch. 2/15	Stipulation to extend time for testy
49.	" 3/15	Times extended. F. H. July 1/15.
50.	Mch. 17/15	Stipulation to extend time for testy
51.	" 18/15	Times extended F. H. July 20/15.
52.	Mch. 25, "	Stipulation to extend time for testy
53.	" 26/15	Times extended. F. H. Aug 17/15.
54.	Apr. 27, "	Stipulation to extend time for testy
55.	" 28/15	Times extended. H. H. Sept. 2/15

56.	May 17, 1915	Stipulated testy for de Ferranti
57.	" 18, "	Receipt of stipulation & copy of patent acknowledged.
58.	June 15, "	Stipulation to extend time for testy
59.	" 17, "	Times extended. F. H. Nov. 2/15.
60.	Aug. 12/15	Stipulation to extend time for testy (and Affidavits)
31.	Aug. 13/15	Times extended. F. H. Jan'y. 4/16.
32.	Oct. 11, "	Stipulation to extend time for testy
33.	" " "	Letter from Atty for Harmatta
34.	Oct. 12/15	Times extended. F. H. Feb. 3/16.
35.	" 28, "	Motion to dissolve by Harmatta
36.	Nov. 6/1915	Motion to dissolve denied transmission. L. A. Nov. 17/1915. Testimony suspended
37.	" 16, "	Appeal by Harmatta on Motion
38.	" 19, "	Notice of hearing
39.	Dec. 2, "	Brief for Harmatta
40.	" " "	Commr's decision (paper #37)
41.	" 3, "	Notice of decision
42.	" 6, "	Letter from Harmatta
43.	" " "	Supplemental decision by Commr (paper #37)
44.	" " "	Notice of decision
45.	" 7, "	Notice of hr'g by Law Exr
46.	" 8, "	Petition by de Ferranti for rehearing
47.	" 15, "	Authority to Inspect
48.	" 29, "	Commr's decision (paper #46)
49.	" 30, "	Notice of "
50.	Jany. 5/16	Brief for Harmatta
51.	" 19, "	Decision of Law Exr
52.	" 20, "	Notice of decision
53.	Jan. 22/16	Proceedings resumed. Testy set. F. H. July 11/16.
54.	" 26, "	Petition by Harmatta that Commr. exercise supervising authority
54½.	" " "	Brief for de Ferranti
55.	" 28, "	Commr's decision (paper #54)
56.	" 29, "	Notice of decision
57.	April 15/16	Testimony for Harmatta (2 batches)
58.	" " "	Letter to "
59.	" 17, "	Stipulation to Extend time for rebuttal testy of de Ferranti
60.	April 19/16	Times extended. F. Hr'g. August 9/16
61.	June 2, 1916	Motion to Strike out or Suppress by De Ferranti
62.	June 7/16	Action on motion to strike out deferred until F. H. Times extended. F. H. Sept. 8/16.
63.	July 6, "	Stipulation to extend time for testy
64.	" 7, "	Times extended. F. H. Oct. 10/16.
65.	Aug. 7/16	Stipulation to extend time for testy.

66.	Aug. 9/16	Times extended. F. H. Dec. 12/16
67.	Oct. 7, 1916	Stipulation to extend time for rebuttal testy & F. Hrg
68.	" 9, "	Times extended. F. H. Jan. 9/17.
69.	Nov. 14/16	Affidavit for de Ferranti (see paper 67)
70.	" 22/16	Testimony & Exhibits for de Ferranti (in box)
71.	" 23 "	Letter to
72.	" 25, "	Motion by Harmatta to strike out testy
73.	Nov. 28/16	Hearing on motion to strike out set for Dec. 4/16.
74.	Dec. 4/16	Action on motion by Harmatta deferred until Final Hrg.
75.	" 12, "	Stipulation to Extend time for rebuttal testy
76.	Dec. 14/16	Times extended. F. Hrg. March 20/17.
77.	Jan. 3/17	Stipulation to extend time for rebuttal testy
78.	" 15/17	Times extended. F. H. May 17/17.
79.	Feb. 14/17	Stipulation to extend time for rebuttal testy
80.	" 15/17	Times extended. F. H. May 17/17
81.	" 21, "	Authority to Inspect
82.	Mch. 2/17	Authority to Inspect
83.	" 19/17	Stipulation to Extend time for testy
84.	" 21/17	Times extended. F. H. June 19/17.
85.	Apr. 5/17	Authority to Inspect
86.	" 16, "	Motion by De Ferranti to extend time for
87.	" 17, "	testy. Motion by De Ferranti for leave to take testy
88.	" 20, "	abroad Brief for Harmatta in Opposition to Motion
89.	" 17, "	Brief for Harmatta.
90.	Apr. 28/17	Motion to take testy abroad is denied Motion to extend time for rebuttal denied L. A. May 7/17. Testimony susp'd.
91.	May 2, 1917	Appeal by de Ferranti on Motion
92.	" 4, "	Notice of hearing
93.	" 25, "	Brief for Harmatta
94.	" 29, "	Commr's decision
95.	" " "	Notice of decision
96.	June 7/17	Proceedings resumed F. H. Aug. 7/17
97.	" 28, "	Printed record for de Ferranti (31 copies)
98.	" 29, "	Letter to "
99.	July 7/17	Stipulation to postpone F. Hr'g
100.	July 9/17	Final Hearing extended to Sept. 7/17.
101.	" 12, "	Printed record for Harmatta (31 copies)
102.	" 13, "	Letter to "
103.	" 19, "	Notice of Appt of Ass'o Atty
104.	" 24, "	Motion for Judgt by Harmatta
105.	" 26, "	Brief for De Ferranti
106.	July 27/17	Motion for judgment by Harmatta denied

107. Aug. 21/1917 Stipulation to extend time for F. Hrg.
108 " 28, " Final hearing extended to Oct. 16/17.
109.
110.
111.
112.
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120.

ATTORNEYS.

Sebastian Ziani de Ferranti
c/o Spear, Middleton, Donaldson & Spear
City

Ass'o. Melville Church
Washington, D. C.

Johann Harmatta
c/o Townsend & Decker,
149 Broadway
New York, N. Y.

Defendant's Exhibit No. 34

1719

S-888.

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the File Wrapper and Contents in the matter of the

Letters Patent of

Adolph F. Rietzel, Assignor to

Thomson Electric Welding Company,

Number 928,701, Granted July 20, 1909,

for

Improvement in Uniting the Component Parts of Composite Sheet-Metal Structures.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 4th day of August, in the year of our Lord one thousand nine hundred and seventeen and of the Independence of the United States of America the one hundred and forty-second.

Thomas Ewing

Commissioner of Patents

1720

P-487

NUMBER (SERIES OF 19 00).
247,081
48

1905

DIV 37

(EX'R'S BOOK).75 -48-
1-18--

PATENT No. 928701

Name Adolph F. Rietzel,

Assor to Thomson Electric Welding Company, of Lynn, Massachusetts, a croporation of Maine.

of Lynn.

County of

State of Massachusetts.

Invention Method of Electric Welding.

PARTS OF APPLICATION FILED.	ORIGINAL.		RENEWED.	
Petition	Feb. 24	, 19 05		, 190
Affidavit	" "	, 19 05		, 190
Specification	" "	, 19 05		, 190
Drawing	" "	, 19 05		, 190
Model or Specimen		, 19 0		, 190
First Fee Cash $15.	Feb. 24	, 19 05		, 190
" " Cert.		, 19 0		, 190
Appl. filed complete	Feb 24	, 19 05		, 190
Examined	A. P. Shaw Ex June 24, 1909			, 190
Countersigned	W. W. Mortimer For Commissioner.		For Commissioner.	, 190
Notice of Allowance	June 24	, 19 09		, 190
Final Fee Cash $20	June 24	, 19 09		, 190
" " Cert.		, 19 0		, 190
Patented	July	20		, 19 09

Disclaimer filed June 12, 1915

Associate Attorney

Attorney Townsend & Decker
141 Broadway, N. Y. City.

Name

Serial Number

Patent No

Date of Patent

247,081

1721

$15.- RECEIVED
FEB 24 1905 Ck S
CHIEF CLERK U.S.PATENT OFFICE

(Printed letter head omitted.)

NEW YORK, Feb. 20th, 05. 190

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

Enclosed please find application papers and drawings complete in the case of Adolph F. Rietzel for method of electric welding, together with check of $15.00 to cover the cost of the first Government Fee on the same.

Very respectfully,

Townsend & Decker

1722

MAIL ROOM
FEB 24 1903
U.S.PATENT OFFICE

Application.
Serial No. 247,081 Paper No. 1/2

PETITION.

To the Commissioner of Patents;

Your Petitioner Adolph F. Rietzel a citizen of the United States and a resident of Lynn in the County of Essex and State of Massachusetts with P. O. address, Lynn, Mass. prays that Letters Patent may be granted to him for the Method of Electric Welding set forth in the annexed specification; and he hereby appoints Henry C. Townsend and Delbert H. Decker, constituting the firm of Townsend & Decker, of the City of New York, ~~5 Beekman Street (Temple Court)~~ 141 Broadway, his attorneys with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

Adolph F. Rietzel

SPECIFICATION.

To all whom it may concern:

Be it known that I, Adolph F. Rietzel a citizen of the United States and a resident of Lynn in the County of Essex and State of Massachusetts with P. O. address, Lynn, Mass. have invented certain new and useful Improvement in ~~Method of Electric~~ Welding Uniting the Component Parts of Composite Sheet Metal Structures of which the following is a specification:

per Sub. Spec.

My invention relates to a method of forming an electrically welded union between the plane surface of a piece of metal and another piece of metal and is especially useful in uniting two plates or sheets of metal at their plane surfaces.

One of the special objects of the invention is to provide a method whereby a sheet of metal, especially in the thinner gages, may be united on its plane surface to another sheet or to any other piece of metal. For the sake of illustration, however, the process will be described as carried out in uniting two sheets or plates to one another for which purpose the invention is particularly useful. It is to be understood, however, that I do not limit myself to the process as applied to sheet or plate metal or to uniting two plates or sheets with one another, since the invention is also applicable to forming a welded union with a plane surface or contact surface of considerable area in a piece of metal of any form.

It is not practicable by the present process of electric welding to weld together two plates or sheets of metal on their plane surfaces, on account of the large area of surface contact between them, when laid one upon the other, which allows the welding current to pass without bringing them up to a welding heat.

My present invention consists essentially in providing over the surface to be welded, a number of contact spots or points through which the welding current is passed in multiple, and applying pressure in proper way to form a number of distinct electric welds or spots of union over said surface.

These contact spots act to localize the current and the heating to a welding temperature and may be provided either by casting, punching or indenting

the metal of the plane surface with which the welded union is to be made, or otherwise forming the same so as to provide thereon a multiplicity of isolated projections, or said contact spots may be provided by disposing a number of small pieces of metal over said surface, which pieces become united with said surface and with the opposite piece or pieces of metal in the welding process.

Figures 1, 2, 3, 4 and 5 show pieces of metal of different forms interposed between the electrodes of an electric welding machine; figures 6, 7, 8 and 9 show modifications in the form and disposition of the isolated projections.

Fig. 10 shows 3 plates assembled for welding together.

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Referring to figures 1, 2, 3, 4 and 5, the electrodes of an electric welding machine are indicated at A'. These electrodes, as usual in the art, supply heating current to the work interposed between them, and also preferably serve as the means through which welding pressure may be applied to the work while heated to welding temperature. In Fig. 1, piece B' is a plate or sheet of metal to be welded at its plane surface to an opposite plate or sheet B. In this figure the plate B' has a number of isolated contact spots c, which may be formed by indenting the plate and which projections engage directly with the opposite plate B.

In Fig. 2 both plates have projections which engage with one another, although, and as indicated in Fig. 10, each of the contact spots or projections c upon one plate might engage with the plane surface of the opposite plate.

In the operation of forming the weld, current is passed from one plate or piece to the other through the contact spots or projections c, raising the metal to welding temperature at such points, and the application of welding pressure in the usual manner forms spots of welded union

coincident with such points or projections and which firmly unite the pieces together. The contact points, spots or projections might be formed on either or both surfaces by casting the projections thereon which modification is indicated in Figures 3 and 4 wherein the pieces B B' are supposed to be cast metal plates or pieces.

In Fig. 1 and 2 the plates are supposed to be of sheet metal. These plates or projections may be formed, however, in any desired way upon the surface withwhich the welded union is to be made. Instead of providing contact spots consisting of projections from the plane surfaces themselves, they may be provided by interposing separate pieces of metal, c', as indicated in Fig. 5, which are disposed in any desired number, according to the number of points of union desired, over the plane surface with which the welded union is to be formed. These different spots or projections may take any desired form or be disposed in any desired relation to one another and to the boundaries of the surface with which the welded union is to be made.

As shown in Fig. 6 they may be rounded projections disposed near the edges of the plate or they may be somewhat elongated projections as shown in Fig. 7 and 8 and symmetrically or irregularly arranged as shown; as shown in Fig. 9, they may be a combination of round and elongated projections.

As will be obvious their form and disposition may be greatly varied, and as already stated, the manner of producing them is capable of indefinite variation.

Fig. 10 illustrates the welding of 3 plates or sheets together. The number can be extended indefinitely, and while ordinarily only two pieces would be welded at a time, more may be welded provided the current is sufficient.

My invention is of special utility in the manufacture

of articles from sheet metal which are stamped out to different forms, and which heretofore have been joined in a mechanical way requiring expensive dies and tools to produce the finished article. When my invention is employed in this field of manufacture, all that is necessary in order to provide for the union of the pieces is to form or provide the spots or projections in any desired way or in any convenient form on the surface to be united either by punching, indenting or otherwise forming them up or by providing isolated metal pieces as already described, and then to assemble the pieces to be united in an electric welding machine and weld them together as already described.

In some cases it may be sufficient to provide a single projection or spot if the same be sufficiently elongated, which will act, as it were, to localize the heating and welding.

What I claim as my invention is:-

1. The herein described method of welding a piece of metal at a plane surface thereof, consisting in providing a multiplicity of contact spots over said surface, passing a heating electric current over said spots simultaneously, and applying pressure to form a multiplicity of distinct electric welds over said plane surface.

2. The herein described method of welding sheets or plates of metal together on their plane surfaces, consisting in providing a multiplicity of contact points or spots between said surfaces, passing a heating electric current from one plate to the other through said points in multiple and applying pressure in a direction to form a number of points of welded union between said plates and sheets.

3. The herein described method of uniting plates sheets or other metal objects on their plane surfaces, consisting in providing such surface with a multiplicity of contact points or projections, passing a welding current through said projections in multiple and applying pressure to form a number of welds simultaneously at said points.

4. The herein described method of uniting a sheet of metal with another piece of metal consisting in indenting the sheet to form one or more projections from a plane surface thereof, passing a heating electric current through sheet and said projection or projections, and applying pressure to form one or more spots of welded union on such surface.

5. The herein described method of welding two plates or sheets of metal together consisting in indenting the material to form a number of projections from a plane surface thereof heating said projections to a welding temperature simultaneously and applying pressure in a direction perpendicular to said

plane surface to form a number of spots of welded union thereon.

6. The herein described method of welding two plates or sheets of metal together consisting in indenting the material to form a contact spot or spots on a plane surface thereof, superposing said plates or sheets, passing an electric current from one to the other through said contact spots and applying pressure to form a point or points of welded union at said spot or spots.

7. The herein described method of welding two plates or sheets of metal together, consisting in indenting each plate to form a projecting contact spot or spots on a plane surface of each plate, superposing said plates with the projecting spot or spots in engagement with one another, passing a heating electric current from one plate to the other and applying pressure to form a welded union between the plates at said spot or spots.

8. The herein described method of electrically welding a piece of metal at a plane surface thereof consisting in providing such plane surface with a current localizing projection, passing a heating current through such projection and applying pressure to unite said piece with another piece by a welded union coincident with such projection.

1729

Signed at Lynn in the County of Essex and State of Mass. this 7th day of Feb. A. D. 18 1905

Adolph F. Rietzel

Witnesses:

Edwin W. Hawes
F I Foster

OATH.

Lynn Mass
Essex Co. } SS.:

Adolph F. Rietzel the above-named petitioner, being duly sworn, deposes and says that he is a citizen of the United States and resident of Lynn, Mass. and that he verily believes himself to be the original, first and sole inventor of the improvement in Method of Electric Welding described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof; or patented or described in any printed publication in the United States of America or any foreign country before his invention or discovery thereof or more than two years prior to this application; or in public use or on sale in the United States for more than two years prior to this application, and that no application for foreign patent has been filed by him or his legal representatives or assigns in any foreign country, ~~except as follows:~~

Adolph F. Rietzel

Sworn to and subscribed before me this 7th day of Feb. A. D. 18 1905

Wm H Bates

Notary Public.

SEAL

1730

Div. 37 Room 21 — W 980 — Paper No. 1

Address only "The Commissioner of Patents, Washington, D. C." — All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., April 12, 1905.
MAILED

Adolph F. Rietzel,

C/o Townsend & Decker,

141 Broadway,

New York, N. Y.

Please find below a communication from the EXAMINER in charge of the application of your

#247,081, filed Feb. 24, 1905, for Method of Electric Welding.

F. I. Allen
Commissioner of Patents.

Claims 1, 2, 3, 4, 5, 6, 7 and 8 are rejected on Hunter, 690,958, Jan. 14, 1902, Metal heating and Working, Welding, Processes.

Claims 1, 2, 3 and 8 are also rejected on Robb, 434,468, Aug. 19, 1890, or Moxham, 497,808, May 23, 1893, same class as above. To provide the article to be welded with a plurality of projections is a mere matter of duplication.

W.J.S.

A. F. Kinnan Ex

1731

MAIL ROOM
OCT 18 1905
U.S.PATENT OFFICE

DIV. 37, PAPER NO. 2
Amendt A

New York, Oct. 17, 1905.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of Adolph F. Rietzel for Method of Electric Welding, filed Feb. 24th, 1905, S. N. 247,081;

In reply to the Examiner's communication dated Apr. 12th, 1905, please amend as follows:

Erase beginning line 1, page 1, of the specification to the end of line 7, page 2, and substitute:

My invention relates to the union of plates or sheets of metal, especially in the thinner gages, face to face, and its object is more particularly to provide an efficient and cheap substitute for the methods heretofore employed for uniting pieces of sheet metal face to face. Heretofore in sheet metal working the usual way of fastening two pieces of sheet metal together face to face has been by the employment of fastening screws or bolts or by the use of tongues or projections on one sheet entering perforations or openings in the other sheet or plate and turned down or bent to lock the pieces together. Sometimes such plates or sheets of metal have been united by riveting them together at points sufficient in number or sufficiently near to one another to form a strong and effective means of clamping or fastening the two pieces together.

My present invention provides for the union of plates or sheets of metal together face to face by electric welding, which as ordinarily practised, could not be used for the purpose should it be attempted to unite the sheets together over their whole plane surfaces on account of the large area of surface contact which would exist if the plates were simply laid one upon the

other distinct modification of the form of the plane surface or without some means for restricting the extent of the welded union.

The present invention consists essentially in a welded union of two plates or sheets of metal made by electrically welding them together on their plane faces at a number or multiplicity of distinct or isolated points, which points of union are isolated spots, points or surfaces of union after the completion of the weld. The contact spots or points of union may be fixed or determined by either casting, punching or indenting the metal of the plane surface or otherwise forming the same so as to provide thereon a multiplicity of isolated projections, or said contact spots may be provided by disposing a number of small pieces of metal over said surface, which pieces become united with said surface and with the opposite piece or pieces of metal in the welding process."

Erase the claims and substitute:

1- Metal plates fastened together over their plane surfaces by a number of distinct isolated welds or unions.

2- The method of fastening plates of metal of any gage together by their plane surfaces, consisting in providing a multiplicity of contact spots over said surface, passing a heating electric current over said spots simultaneously, and applying pressure to simultaneously form a multiplicity of mechanically distinct electrically welded points of union on the plane surfaces presented to one another.

3- The herein described method of fastening two pieces of metal together, consisting in providing each plate with a number of projecting contact spots on its plane surface, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other through such spots, simultaneously

applying pressure and completing the process with the formation of a multiplicity of distinct points of welded union coincident with the spots of contact.

4- The method of fastening two plates of metal together consisting in providing between them a number of contact spots for passage of the electric current from one to the other by their plane surfaces, passing a heating electric current through such spots simultaneously, applying pressure and finishing the process with the formation of a multiplicity of points of union over the surfaces presented to one another, as and for the purpose described.

5- The herein described method of fastening two plates, consisting in indenting each plate to form a number of projecting contact spots on a plane surface of each plate, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other and applying pressure to form a multiplicity of points of welded union between the plates at said spot or spots.

Remarks.

There is a radical distinction between applicant's invention and that described in the Hunter combination, in which the purpose is primarily to form in the first place a union of sheets of metal end to end. Applicant's process in substance involves the union of two plates or sheets of metal face to face so as to fasten them together over practically their whole abutting faces. Further, however, the Hunter process involves not the union at a number of distinct points of weld, but as specifically set out, contemplates the melting of the metal so as to make a full transverse weld or as set out at line 68, "a simultaneous series of gradually-extending welds, which ultimately unite" This is a process, which of necessity, involves the formation of the contact spots originally in sufficiently close proximity to allow the welding to extend and merge the spots into one whole

or full weld with necessarily a corresponding expenditure of power incident to the employment of spots in much greater number than is essential to applicant's process. Applicant's invention provides an efficient and cheap substitute for those methods of fastening plates of metal together which have heretofore been employed and which comprise essentially a number of points of mechanical attachment of one to the other by tongues, rivets or similar devices. The Hunter invention might at first blush seem to be of the same nature as applicant's, but when closely examined will be found to be similar only in the point that electric welding is used and that the welding is started over points of contact. This was not broadly new with Hunter as is shown to be the fact by the Robb patent. Applicant's invention is clearly differentiated from both Hunter and Robb in that the union is not formed over the whole cross sectional area of the pieces of metal or portions of pieces to which the welding pressure is applied.

The application has now fully been revised to limit it to the essential differences and it is hoped that a speedy allowance of the application may be had.

Respectfully submitted,

A. F. Rietzel

By Townsend & Decker

Attorneys.

1735

Div. 37 Room 107

Address only "The Commissioner of Patents, Washington, D. C."

2-200

Paper No. 3

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

AS

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., Oct. 24, 1905.
MAILED

Adolph F. Rietzel,

Care Townsend & Decker,

New York City.

Please find below a communication from the EXAMINER in charge of the application of your

for Method of Electric Welding, filed Feb. 24, 1905, Ser. No. 247,081

F. I. Allen
Commissioner of Patents.

This is in response to amendment of Oct. 18, 1905.

In the amendment filed Oct. 18, 1905, page 2, line 1, some word has evidently been omitted. It is suggested that without should be inserted after other.

Claim 1 is rejected on Thomson, 396,015, Jan. 8, 1889 (Metal Heating and working, Riveting).

Claims 2, 3, 4 and 5 are rejected on Hunter, 690,958, as they involve the same method. The same steps in the process of welding the plates together are taken in both cases, only that in Hunter the welding heat and pressure are continued until the separate welds unite, while applicant stops short of this, which, however, does not involve invention.

Rule.

A. F. Kinnan Ex

1736

MAIL ROOM
OCT 23 1906
U.S.PATENT OFFICE

DIV. 37 PAPER NO. 4
Sub. Spec.

New York, Oct. 22nd, 1906.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of Adolph P. Rietzel for Method of Electric Welding, filed Feb. 24th, 1905, S. N. 247,081;

In reply to Office letter of Oct. 24th, 1905, please amend as follows:

In the title of the invention erase "Method of Electric Welding" and substitute "Uniting the Component Parts of Composite Sheet Metal Structures".

Sub. Spec

Erase the specification and claims and all amendments thereto and substitute:

"The present invention relates to the manner of forming a union of two plates or sheets of metal especially in the thinner guages in those cases where it is desired to form a composite metal structure in which the sheets or plates are securely fastened together at their plane faces.

Sub. D

Sub. Spec.

Heretofore in forming a union between two pieces of sheet metal when it is desired to secure them together at their plane faces, the practice has been to use fastening screws or bolts or tongues or projections on one sheet or piece lapped or turned down upon the other to lock them together.

It has also been proposed to unite the two pieces in order to form the desired structure, by riveting them together at a number of points sufficient in number or suffi-

ciently near together to clamp or secure them firmly together.

The present invention consists essentially of a welded union of two plates or sheets of metal at their plane faces by a multiplicity of distinct or isolated points of electrically welded union.

The invention is especially useful in the manufacture of articles from sheet metal in which the completed article is a composite sheet metal structure.

In carrying out the invention, the distinct or isolated points of welded union are determined by the location or disposition of initial electrical contacts cast, punched or indented in the plane surfaces of the metal or otherwise formed so as to provide a multiplicity of isolated contact spots for the passage of an electric current, which heats the metal at the contact spots or points contiguous thereto to a welding temperature so that on application of pressure the corresponding number of welded points of union are established which unite the sheets firmly together.

Also in carrying out the invention, the initial contact spots coinciding with the finished points of union may be provided by disposing a number of small pieces of metal over the surfaces presented to one another, which pieces become united with said surfaces in the welding process.

In carrying out the invention, the points of contact are separated from one another or so disposed that the unions will not run into one another. By so spreading the spots, it is possible to effect the union with less consumption of power than would be required if they were so close together as to run into one another, since in the latter case,

it is obvious that a large number of spots would be required and consequently a larger amount of heating current would have to pass in order to heat them all to welding temperature. It will be found, however, that a perfectly firm and tenacious union of the plates can be secured when the distance between the spots is made such that the union is at a number of isolated of distinct spots of welded union instead of by a continuous line.

Figures 1, 2, 3, 4 and 5 show pieces of metal of different forms interposed between the electrodes of an electric welding machine; Figs. 6, 7, 8 and 9 show modifications in the form and disposition of the isolated projections.

ub. Spec. er C. Fig. 10 shows 3 plates assembled for welding together.

Referring to Figs. 1, 2, 3, 4 and 5, the electrodes of an electric welding machine are indicated at A, A'. These electrodes, as usual in the art, supply heating current to the work interposed between them, and also preferably serve as the means through which welding pressure may be applied to the work while heated to welding temperature. In Fig. 1, piece B' is a plate or sheet of metal to be welded at its plane surface to an opposite plate or sheet B. In this figure the plate B' has a number of isolated contact spots c, which may be formed by indenting the plate and which projections engage directly with the opposite plate B.

As before stated, these spots are isolated from one another and separated by such spaces that after the application of the heating current and the pressure the union will be at a number of distinct or isolated welded points and will not consist of a continuous line of unions coincident with said spots as would be the case if the spots were close together and larger in number so as to require more power and to cause

the welds to run into one another.

In Fig. 2 both plates have projections which engage with one another, although, and as indicated in Fig. 10, each of the contact spots or projections c upon one plate might engage with the plane surface of the opposite plate.

In the operation of forming the weld, current is passed from one plate or piece to the other through the con-
Sub. Spec. act spots or projections c, raising themetal to welding temperature at such points, and the application of welding pressure in the usual manner forms spots of welded union coincident with such points or projections andwhich firmly unite the pieces together. The contact points, spots or projections might be formed on either or both surfaces by casting the projections thereon which modification is indicated in Figs. 3 and 4 wherein the pieces B, B' are supposed to be cast metal plates or pieces.

In Figs. 1 and 2 the plates are supposed to be of sheet metal. These plates or projections may be formed, however, in any desired way upon the surface with which the welded union is to be made. Instead of providing contact spots consisting of projections from the plane surfaces themselves, they may be provided by interposing separate pieces of metal, C', as indicated in Fig. 5 which are disposed in any desired number, according to the number of points of union desired, over the plane surface with which the welded union is to be formed. These different spots or projections may take any desired form or be disposed in any desired relation to one another and to the boundaries of the surface with which the welded union is to be made.

As shown in Fig. 6, they may be rounded projections disposed near the edges of the plate or they may be somewhat elongated projections as shown in Figs. 7 and 8 and symmetri-

cally or irregularly arranged as shown; as shown in Fig. 9, they may be a combination of round and elongated projections.

As will be obvious their form and disposition may be greatly varied, and as already stated, the manner of producing them is capable of indefinite variation.

Fig. 10 illustrates the welding of 3 plates or sheets together. The number can be extended indefinitely, and while ordinarily only two pieces would be welded at a time, more may be welded provided the current is sufficient.

The invention is of special utility in the manufacture of articles from sheet metal which are stamped out to different forms, and which heretofore have been joined in a mechanical way requiring expensive dies and tools to produce the finished article. When the invention is employed in this field of manufacture, all that is necessary in order to provide for the union of the pieces is to form or provide the spots or projections in any desired way or in any convenient form on the surface to be united, either by punching, indenting or otherwise forming them up or by providing isolated metal pieces to be united in an electric welding machine and weld them together as already described.

Sub. Spec.

I am aware that it has been before proposed to unite two plates or sheets of metal electrically by providing points of contact so disposed that on the passage of the current, the softened metal of contiguous spots will run together making a continuous welded line, but in my plan of union no such action takes places, since the number of spots or their proximity to one another is determined by the number of distinct spots of welded union required to give the desired strength and is not such as to cause the molten metal to flow and form a continuous line of molten metal uniting all the spots.

What I claim as my invention is:

1- Metal plates fastened together at their plane surfaces by a number of distinct or isolated welds formed between such surfaces.

2- Composite sheet metal work formed by a union of the component sheets at a multiplicity of distinct or isolated points of electrically welded union over their abutting faces.

3- Articles of composite sheet metal manufacture having their component parts united at their plane faces by a multiplicity of distinct or separate points of electrically welded union.

4- The herein described method of fastening two plates or sheets of metal of any guage together at distinct points of union disposed over their plane surfaces, consisting in providing a multiplicity of electrical contact spots over said surfaces coincident with the separated spots of union, passing electric current from one plate to the other through said contact spots simultaneously and applying pressure to effect the union at the distinct or isolated spots between said plane surfaces.

5- The herein described method of fastening two pieces of metal together by providing each plate with a number of projecting contact spots on its plane surface disposed at such distances apart that the unions will not run into one another but will, nevertheless, firmly hold the plates together, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other through the spots and simultaneously applying pressure thus uniting the plates at a number of distinct points of welded union.

6- The method of fastening two plates of metal together

1742

at a multiplicity of distinct or separate points of welded union, consisting in providing between them a number of isolated contact spots adapted to pass an electric current from one to the other but so separated that the electric welds will not extend into one another from one spot to the next, passing a heating electric current through such spots simultaneously and applying pressure as and for the purpose described.,

. Spec.

7- The herein described method of fastening two plates together at a multiplicity of distinct mechanically separated points of welded union, consisting in indenting each plate to form a number of projecting contact spots on the plane surfaces which are to abut, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other thereby forming a number of distinct zones or points of heated metal heated to welding temperature, and applying pressure to complete the union of plates by a number of mechanically distinct unions."

REMARKS.

We present herewith an entire new specification and claims which more fully set forth the invention and distinguish the same from anything disclosed in the Thomson or Hunter patents. The Hunter invention both in conception and execution is radically different from applicant's invention. In Hunter the primary purpose was to form a ~~x~~ continuous line of welded union. In applicant's case the desgin was, broadly speaking, to form a union at a number of distinct or isolated spots chosen as to frequency or number or distance apart for the desired strength of union face to face of two plates of sheet metal. In Hunter the requirements of his process are not satisfied unless the initial contact spots are so close together that the welds will extend into one another to make

a continuous line of union. It is distinctly stated in his specification that when the projections melt, small lakes of molten metal are formed which quickly spread and unite. As a matter of fact this requires that the points or spots should be very close indeed to one another and so that it would not be possible, as suggested by the examiner, to stop the process at a point such that separate welds would be formed. This would be quickly appreciated by the examiner if he should see the process of welding as carried out by applicant in the uniting of two plates or sheets of metal face to face. As well understood by those skilled in this art, the initial pressure during which the heating to welding temperature takes place is accompanied by a pressure upon the work sufficient to insure good connection electrically, but this pressure is not the efficient welding pressure. As soon as the welding temperature has been attained the weld is effected by a smart or quick application of the heavy or welding pressure. The suggestion of the examiner practically amounts to the suggestion that this heavy welding pressure could be stopped at an intermediate stage in practising the Hunter invention so as to produce separate welds. To this the applicant replied that it would be, in the first place, impossible for the operator to adjust or stop this welding pressure at any particular stage of the operation of effecting the union no matter what the number of proximity of the spots and that in the next place it is essential in the Hunter process that the projections should be so near together that the small lakes of molten metal or fused metal will be formed and will quickly spread and unite so x that obviously distinct points of union are impossible from the very nature of the process as detailed by Hunter.

It must be further apparent that in the Hunter process it is essential that a very great number of points of

union must be used or any given area of plates to be united, as compared with the number required in applicant's process, and hence when economically considered the consumption of power must be much greater in Hunter's case then in applicant's.

Moreover, as a structure a piece of composite sheet metal work in which the union face to face is effected by a multiplicity of distinct points of welded union between the abutting plane faces is a distinctly different thing from a structure like Hunter's in which xx two plates of metal are united simply by lapping their ends for a shorter distance upon one another and forming a continuous line of welded union extending transversely across the plates. From every standpoint, the two inventions are distinctly different.

Regarding the Thomson patent, we have simply to say that this describes the riveting of pieces of metal together by a number of rivets. This is quite a different thing from the union of two plates of sheet metal face to face by isolated electrically welded spots on the abutting faces of the plates.

A reconsideration is respectfully requested.

Respectfully submitted,

A. F. Rietzel

By Townsend & Decker

Attorneys.

1745

Div. XVI. Room 10°. C.E.N. .2 260

Address only "The Commissioner of Patents, Washington, D. C."

Paper No. 5.

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., November 9, 1906.

MAILED

Adolph E. Rietzel,

C/o Townsend & Decker,

141 Broadway,
New York, New York.

Please find below a communication from the EXAMINER in charge of your application of

#247,081, filed February 24, 1905, for Uniting the Component Parts of Composite Sheet Metal Structures.

F. I. Allen

Commissioner of Patents.

This action is in response to applicant's communication of October 23, 1906.

In line 16, page 3, insert A, before "A'".

The claims present nothing patentable over Hunter of record. It is held that there is no invention in merely spacing the projections "b" further apart than Hunter does, especially if it is not deemed necessary to have a continuous weld. As it is old to unite plates at a multiplicity of distinct or isolated points by rivets, as shown in Thomson of record, it is held that to decrease the number of projections on Hunter's plates so that there will be a multiplicity of distinct or isolated points of welded union does notamount to a patentable distinction. With regard to having projections on both plates, attention is called to lines 52-54, page 3 of the Hunter patent, in which he states that "the projections or points of contact" are "upon the edges of one or both plates".

Claims 1, 2, and 3 are also rejected on Thomson. In lines 25-33, page 1, he states that, by allowing the current to pass for a longer period, he can weld the pieces together around the rivet by the application of pressure. From this it follows

1746

that the plates will be united at a multiplicity of distinct and isolated welds. It is true that the plates are riveted at these points but they are also welded together.

The claims are rejected.

Campbell

Examiner, Division XVI.

W.P.J.

1747

MAIL ROOM
NOV 19 1906
U.S.PATENT OFFICE

PATENT OFFICE,
NOV 20 1906
DIV. 16, FILED.

PAPER NO. 6
AMENDMENT. B

New York, Nov. 16, 1906.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of Adolph F. Rietzel for Uniting the Component Parts of Composite Sheet Metal Structures, filed Feb. 24th, 1905, S. N. 247,081;

In reply to Office letter dated Nov. 9th, 1906, please amend as follows:

Erase the paragraph at the top of page 2 of the substitute specification filed Oct. 23rd, 1906 and beginning with the words "The present invention consists essentially" and substitute the following:

"The present invention consists essentially of a welded union of two plates or sheets of metal at their plane faces formed wholly by a multiplicity of distinct or isolated points of electrically welded union coincident with and composed of the material embraced in raised eleptrical contact spots in the plane surfaces of the metal."

In the paragraph beginning with the words "In carrying out the invention" on the same page and in the third line thereof insert a "," after the word "of", and before the word "initial" insert "and embrace the material comprising"

Erase the claims 1, 2 and 3 and substitute:

"1- Metal plates fastened together at their plane surfaces by a number of distinct or isolated welds between such

surfaces formed wholly of portions of the plane surfaces of said plates.

2- Composite sheet metal work formed by a union of the component sheets by a multiplicity of distinct or isolated welds disposed over their abutting faces and each coincident with and comprising material embraced in raised electrical contact spots in the plane surfaces of the metal, as and for the purpose described.

3- Articles of composite sheet metal manufacture, wholly united at their plane faces by a multiplicity of distinct or separated points of electrically welded union composed of the material of the plates themselves."

R--E--M--A--R--K--S.

In the foregoing amendment of claims 1, 2 and 3, we have differentiated applicant's invention from anything contained in the Thomson patent. That patent constitutes the prior art recognized by applicant in his specification and a careful consideration thereof will make it clear that applicant has made a distinct advance in this art worthy of a patent. It is clear that in the Thomson patent the use of a rivet is made essential. It does not matter whether the heating is carried on to the point such that the rivet itself will, at its edges, become fused to the edges of the opening in the metal plates or that he describes a continuation of theheating until the contiguous portions of the plate may become welded together. The rivet is there and must be provided to become an essential part of the union. To produce the union, according to the Thomson patent, there is involved a preliminary punching of the plates with holes, the provision of a rivet, the insertion of the rivet in the hole and the application of a peculiar form of

die to each of the rivets separately, the form being adapted to the particular shape of rivet head which it is desired to make.

In applicant's welded union, there is a distinct new thought that a union might be secured by a simple union of the plane faces of the sheets at a number of distinct or isolated points and without the use of any rivets, by simply making the proper initial contact spots on the plane faces of the metal sheets and letting such initial contact spots become embraced in the union so as to constitute practically the uniting material.

There is nothing in the Thomson patent suggesting such a thing for it does not say a work about producing any projections or contact spots in the plane surfaces of the metal sheets and unless that be done, no union, such as mentioned in the examiner's letter, would be possible without the use of the rivet to form the initial heating path for the current. Only upon the theory that it would be possible and also an obvious thing to omit the rivets of Thomson, can the suggestion of welding at points around the rivets, as contained in that patent, be of any avail to anticipate applicant's invention, but as just stated, to omit the rivets in Thomson would not be possible for there would then be left no means for localizing the heating current. These considerations we submit are sufficient to make the Thomson patent insufficient as a reference or anticipation of applicant's invention. We also, however place out objection to the sufficiency of that reference upon the distinct fround that applicant's invention as set out and claimed by him excludes the use of rivets and that there is no suggestion in the Thomson patent of omitting the rivets, nor would it be obvious to any one that such rivets could be omitted and the proper union secured without them.

In regard to the Hunter patent and the suggestion now offered by the examiner that Hunter might place his contact

points at distances further apart than is described in his patent and thereby satisfy the requirements of applicant's invention we respectfully reply that there is no such suggestion in the Hunter patent and that, moreover, if the distances were made substantially greater, it would be either impossible to practise the Hunter invention which requires that small lakes of molten metal shall be formed, that, as the specification states,"quickly spread and unite", or else the pressure and passage of current would have to be continued so long as to result either in the complete melting down of the whole material of the plates and the consumption of an inordinate amount of power. In other words, there is a distinct and unmistakable difference between the Hunter process which requires such propinquity of the contact spots that by the use of current sufficient in amount or in period of application, there will be a merging of the welds into one another to make practically one weld by the flowing of small lakes of molten metal into one another, and a process in which the contact spots are chosen with reference to the formation of distinct points of weld by the application of the usual current and pressure, the number of points being chosen wholly with reference to the production of a union which, in the multiplication of the isolated unions, shall produce a fastening of the plates together with the desired strength.

The suggestion of the Examiner that the latter process is suggested by Thomson taken in connection with Hunter clearly is of no force in view of the fact that the Thomson process as outlined in his patent could not be practised at all if the rivets were dispensed with or, in other words, the rivets are with Thomson the essential means for forming the paths of the initial heating current and in fact would be substitutes to that extent of the contact projections formed by indenting the plates in the manner proposed by applicant.

It is clearly going beyond the point by any possibility hinted at in the Thomson patent to say that that patent discloses to one skilled in the art the idea of dispensing entirely with the rivets, and as a substitute for such rivets in forming the initial contact or path between the jaws of the machine, using contacts formed by indenting the plane surfaces of the metal at points coincident with the axes of the rivet holes

It is alike outside of any possible suggestion contained in the Thomson patent to say that the patent discloses the idea of omitting the rivets altogether, leaving the holes punched in the material and raising the material around the punched holes so as to form welds over the areas around said holes. We submit not only that neither of the two patents discloses the invention for which applicant seeks a patent. Nor can it be justly said that taking the two patents together, they furnish an obvious suggestion to one skilled in this art of applicant's invention. The fact of the matter is that the process and the product devised by applicant are a distinctly new thing in this art and they mark an advance in the art by a step much broader than anything separating the Hunter patent from the art previous to his date of filing, April 7th, 1898.

Respectfully submitted,

A. F. Rietzel

By Townsend & Decker

Attorneys.

1752

Div. XVI. Room 109. C.E.N. 2-260

Address only "The Commissioner of Patents, Washington, D.C."

Paper No. 7.

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., December 5, 1906.
MAILED

Adolph E. Rietzel,

C/o Townsend & Decker,

141 Broadway,

New York, New York.

Please find below a communication from the EXAMINER in charge of your *application of* #247,081, filed February 24, 1905, for Uniting the Component Parts of Composite Sheet Metal Structures.

F. I. Allen

Commissioner of Patents.

This action is in response to amendment of November 19, 1906.

The second paragraph of the office letter of November 9, 1906, is repeated.

The former action with respect to the claims is believed to be sound and is adhered to. It is still held that there is no patentable invention in merely providing projections or points of contact on the plates so spaced that the welds produced will be isolated and distinct.

Theclaims are rejected on the references and for the reasons of recrod.

Campbell

W.P.J.

Examiner, Division XVI.

1758

Serial No. 247,081 *Paper No.* 8

APPEAL.

Name, A. F. Rietzel

Filed Feb. 24, 1907.

Title. Uniting the Component Parts of Composite Sheet Metal Structures.

TO EXAMINERS-IN-CHIEF.

Reasons for appeal, Nov. 30 - 1907.

Examiner's statement, Jan. 30-1908; Exr's Supplementary Statement, June 8-1908

Notice of hearing,

Brief,

Decision,

Notice of decision,

TO COMMISSIONER.

Received,

Brief,

Notice of hearing,

Decision,

Notice of decision,

1754

Div. XVI. Room 10 C.E.N. 9-280 Paper No. 9A

Address only "The Commissioner of Patents, Washington, D. C." All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., December 9, 1907.
MAILED

Adolph F. Rietzel,

C/o Townsend & Decker,

141 Broadway,

New York, New York.

Please find below a communication from the EXAMINER in charge of the application of your #247,081, filed February 24, 1905, for Uniting the Component Parts of Composite Sheet Metal Structures.

E. B. Wilson

Commissioner of Patents.

The appeal in this case has not been forwarded as it seems to be premature. The formal matter referred to in office letters of November 9, 1906, and December 5, 1906, has not received attention, and the first three claims have not been twice rejected.

Wm A Kinnan

Examiner, Division XVI.

MAIL ROOM
DEC 18 1907
U.S.PATENT OFFICE

PATENT OFFICE
DEC 23 1907
DIV. 16, FILED.

PAPER NO. 10
AMENDMENT C

New York, Dec. 16, 1907.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In thematter of the application of Adolph F. Rietzel, for Uniting the Component Parts of Composite Sheet Metal Structures, filed Feb. 24th, 1905, S. N. 247,081;

In reply to Office letter dated Dec. 9th, 1907, please amend as follows:

Page 3, line 16, before A' insert "A"

Remarks.

A reconsideration of claims 1, 2 and 3 is requested and attention again called to the facts set forth in the argument accompanying the amendment filed Nov. 19th, 1906.

Respectfully,

A. F. Rietzel

By Townsend & Decker

Attorneys.

1756

Div. XVI. Room 109. C.E.N. 2-260 Paper No. 11.

Address only "The Commissioner of Patents, Washington, D. C."

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

Adolph E. Rietzel,
C/o Townsend & Decker,
141 Broadway,
New York, New York.

WASHINGTON, D.C., January 27, 1908.
MAILED " " "

Please find below a communication from the EXAMINER in charge of ~~the~~ your application of

#247,081, filed February 24, 1905, for Uniting the Component Parts of Composite Sheet Metal Structures.

E. B. Moore
Commissioner of Patents.

This action is in response to amendment of December 18, 1907.

All the claims are again and finally rejected on the referemces and for the reasons of record.

Backus

Wm A Kinnan

Examiner, Division XVI.

MAIL ROOM
JAN 30 1908
U.S.PATENT OFFICE

PATENT OFFICE
FEB 1 1908
DIV. 16 FILED.

PAPER NO.12
LETTER

New York, Jan. 29, 1908.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of Adolph F. Rietzel for Uniting the Component Parts of Composite Sheet Metal Structures, filed Feb. 24th, 1905, S. N. 247,081;

Replying to the Examiner's letter dated Jan. 27th, 1908, we request that the appeal dated Nov. 27th, 1907, be forwarded.

Respectfully,

Adolph F. Rietzel

By Townsend & Decker

Attorneys.

1758

MAIL ROOM
MAY 28 1908
U.S.PATENT OFFICE

U.S.PATENT OFFICE
JUN 1 1908
DIV. 13.

Serial No.247,081,Paper No.13
Letter

New York, May 27th, 1908.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:-

In the matter of the application of Adolph F. Rietzel, for Uniting the Component Parts of Composite Sheet Metal Structures;

We understand that the Examiner, in view of the representations made at the personal interview referred to in our communication of April 20th 1908, and on further consideration of the case in connection with the specimens filed at that time, is prepared to recede from his position that there is no patentable merit in the case over the Hunter patent but that he holds to the view that the claims do not clearly express the difference over the Hunter process and apparatus in this respect, to wit; that the metal between the points in the present process is not brought to the plastic or welding condition.

Upon this point, to wit; whether the claims bring out this difference we ask a reconsideration.

It would seem clear that this difference is clearly stated in claim 1 by the term "isolated welds" and in claims 2 and 3 by the terms or expressions "multiplicity of distinct or isolated or separated points of union".

The same idea also is, we think, clearly expressed in claim 4 and certainly in claim 5 by the statement that the contact spots are so far separated that the welds or unions will not extend into one another.

The same idea is also expressed in claims 6 and 7.

In view of the facts, as we understand them, we accordingly request a further action on the merits of the case which, in our view, should be an allowance of the case on the claims in the form in which they now stand.

Respectfully submitted,

A. F. Rietzel

By Townsend & Decker

Attorneys.

1760

Div. 26 Room 105.

Address only "The Commissioner of Patents, Washington, D. C."

2-260

PH

Paper No. 14.

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., June 8, 1908.
MAILED " " "

Adolph F. Rietzel,

Care, Townsend & Decker,

141 Broadway, New York, N. Y.

Please find below a communication from the EXAMINER in charge of the application of your

for "Method of Electric Welding", filed Feb. 24, 1905, Serial No. 247,081.

E. B. Moore

Commissioner of Patents

In response to communication of May 28, 1908.

This case has recently been transferred to division 26.

The Examiner now in charge of this case has no knowledge of the personal interview referred to in the applicant's letter of above date, and is aware of no reason why the appeal should be withdrawn and the claims reconsidered. The applicant's request for reconsideration is accordingly refused, and the appeal should be prosecuted.

The Examiner proposes to direct the attention of the Board of Examiners-in-Chief to the British patent to Harmatta, 22,981 of 1903, Class 219, Welding (see Fig. 4 and lines 32 and 33, page 5), as additional ground for the rejection of claims 1, 3, 4 and 6. Fig. 4 of this patent shows a spot weld, which takes the place of a rivet, and it is not considered to be a patentable improvement to join two sheet metal plates by a number of such "spot welds".

HL

A. P. Shaw Ex

Div. 26 Room 105.

Address only "The Commissioner of Patents, Washington, D. C."

2-280

Paper No. 15.

All communications respecting this application should give the serial number, date of filing, and title of invention.

PH

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., June 16, 1908.

MAILED

Adolph F. Rietzel,

Care, Townsend & Decker,

141 Broadway, New York, N. Y.

Please find below a communication from the EXAMINER in charge of the application of your for "Method of Electric Welding", filed Feb. 24, 1905, Serial No. 247,081.

E. B. Moore

Commissioner of Patents.

This case has been remanded to the Primary Examiner by the Board of Examiners-in-Chief at the request of the applicant. This request was filed June 13, 1908, and is to be found in the appeal file.

In view of this request and of the fact that the applicant desires to be heard before the Primary Examiner on a new reference that was cited in the case in the Examiner's supplemental statement of June 8, 1908, the final rejection is withdrawn.

The claims stand rejected, and the case awaits amendment on the part of the applicant.

A. P. Shaw Ex

HL

1762

MAIL ROOM U.S.PATENT OFFICE Serial No.247,081 Paper No.16
NOV 30 1908 DEC 1 1908 Amend't D and Affidavits
U.S.PATENT OFFICE DIVISION 26

New York, Nov. 24th, 1908.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application for patent of Adolph F. Rietzel for Composite Metal Structure, filed February 24, 1905, S. N. 247,081:

We hereby amend as follows:

Erase the specification and claims and all amendments thereto and substitute the following:

My invention relates to the manner of uniting or fastening two pieces of metal to one another and its object is more particularly to afford a substitute for the manner of uniting pieces of metal as heretofore practised in the art of electric welding.

As applied to sheet metal manufactures the object is to afford a cheap and practical substitute for riveting and other methods of mechanically securing the two pieces of metal together.

As applied to this branch of the metal working arts, the invention affords a means whereby articles of composite sheet metal manufacture may be made up by fastening the pieces of metal constituting the structure with a perfectly secure union by a process that can be economically conducted.

Briefly stated, the invention consists in electrically welding pieces together in a spot or spots definitely located in and involving a portion only of

their meeting surfaces as hereinafter more particularly described and claimed.

It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over ~~the~~ substantially the whole area of the opposed portions of said pieces. It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces.

A weld formed according to my invention is distinguished however from such prior welds by the fact that a portion only of the opposed surfaces is welded together, such portions being coincident with an limited to spots in the areas of such opposed surfaces in which spots the heating electric current is localized or confined in any desired way so that the major portion of the opposed surfaces will not be involved in the welding, although they may, after the completion of the operation, lie in contact with one another or very close together.

My invention is particularly valuable in fastening of pieces of sheet metal together because not only does it limit the amount of electric energy required very considerably as compared with the prior methods of union, but it also diminishes the liability to burning of the metal which is liable to occur when the attempt is made to form a union of two sheets of metal by an

electric welding process over substantially the whole area of the meeting or opposed surfaces.

In carrying out my invention any desired number of spots of union may be employed, such number depending obviously upon the extent of the meeting surfaces which are to be fastened together and also upon the strength of the union desired.

In carrying out my invention the localization of the flow of heating electric current and of welding pressure to the desired spot or spots may be brought about in any desired way. One of the preferred ways is by providing between the meeting surfaces or portions of the pieces to be united suitable conducting projections or points at the spots of union, which projections or points carrying the heating electric current from one piece to the other are so located in the meeting surfaces and are so separated from one another that on the application of the welding pressure the welded union resulting will be localized in the, area of the opposed surfaces and will be substantially coextensive in area with the restricted area of the path of the effective heating current. Various ways of providing such points or projections will occur to those skilled in the art.

The preferred method is to indent the metal from the side reverse to that on which the union is effected by a suitable tool, the projections thus formed affording points for the passage of the electric current. This method is preferable also because it permits the wedling to be produced at a multiplicity of spots simultaneously through the application of pressure over the whole rear surface of the plate, the points or pro-

jections in that case serving not only to localize the flow of the heating current but also to localize the welding pressure. In the preferred manner of carrying out my invention in the case of sheet metal manufacture I provide projections from the meeting surfaces of both pieces that are to be united. Said projections may also be provided by interposing between the two plane sheets small pieces of conducting material which act in the same manner when the sheets are brought together, as projections which localize the heating current and the pressure. It will be understood, however, that in the latter instance as in the former, these pieces are so small and are placed such a distance apart that on the application of welding pressure there will be no running of the welds into one another but that the final union will be in spots only leaving well-defined areas on the meeting surfaces, in which the surfaces either lie in contact or separated from one another by a very think space.

From the foregoing it will be seen that my invention is distinguished from prior methods of welding pieces of metal together in that it may be very cheaply practised, because no attempt is made to weld over the whole of the opposed surfaces of the welded pieces; but on the contrary the union is at a spot or spots only which in ordinary cases will afford as strong a union as would be produced by the riveting of the pieces.

The invention further has the advantage that not nearly so much electric energy is required as is necessary when the electrically welded union extends over the whole area of the opposed surfaces. Moreover, the danger of burning when the attempt is made to weld two sheets

of metal together by a lap weld is largely eliminated.

In the accompanying drawings Figs. 1, 2, 3, 4 and 5 illustrate some of the ways in which the pieces of metal to be united may be prepared for the welding according to my invention.

Figs. 6, 7, 8, and 9 show modifications in the form and disposition of the contact projections which result in the spots of electrically welded union.

Fig. 10 shows the assembling of three plates together for welding according to my invention.

In the various figures of the drawing the invention is illustrated as carried out with two sheets of metal B.B'. In Fig. 1, plate B.' only is provided with the distinct or isolated spots (c) or projections for the flow of the electric current, to the plate B. which spots or points may be formed by indenting the plate with a suitable tool. The spots are located so far from one another that on the application of pressure coincidentally with the flow of electric current from one plate to the other there will be a number of distinct areas or spots of electrically welded union of the plates separated by well-defined areas on the meeting surfaces in which no union takes place. The resultant is however a fastening of the plates together securely and which is practically as effective as if the attempt were made to form a welded union over the entire areas of the meeting surfaces. Obviously, the greater the distance between the spots the lesser the number that would be used and hence the lesser the consumption of energy in effecting the weld. This is of considerable importance where the meeting areas are large or

where a considerable amount of work has to be done. The welding pressure is conveniently applied by conducting-blocks or electrodes, A, A', between which the two pieces B, B', are assembled. These electrodes, A, A', furnish the heating current while applying the pressure, the localization of the pressure in the spots being brought about in this instance by the pointing of the surfaces at point c.

In Fig. 2 both plates are provided with projections the points of which engage with one another, the pointing being produced by indenting the metal sheets from the rear.

Fig. 3 illustrates the localization of the welding by casting projections upon one of the sheets and Fig. 4 by casting projections on both pieces. The localization of the welding in spots might be affected as illustrated in Fig. 5 by interposing small pieces of metal at the spot or spots of desired union, these pieces operating when the plates are brought together in the same way as the projections before referred to. The number and size of the pieces and their distance apart is in this case, as before, so chosen that the application of pressure together with the flow of heating current from one plate to the other will result in a union of the two pieces over their opposed surfaces in spots only thereon.

Fig. 6 shows how the spots might be disposed to fasten the pieces together in distinct spots around their edges.

As shown in Figs. 7 and 8 the projections, instead of being round, might be somewhat elongated and

irregularly or symmetrically arranged.

Fig. 9 shows round and somewhat elongated projections combined.

In all these instances however, the union over the surfaces of the plates is confined to spots or areas which are of comparatively small extent as compared with the total area of the meeting surfaces. As will be obvious, the form and disposition of the points or projections of initial contact for flow of the electric current and localization of the pressure may be greatly varied without departing from my invention.

Fig. 10 illustrates the welding of three plates of sheets together when superposed.

My invention is especially useful in the manufacture of articles from sheet metal which are stamped out to different forms, and which have heretofore had their component portions united by riveting or other purely mechanical expedient which is not only expensive but requires generally special tools and results in many cases in an insecure union. When the invention is employed in its perferred form or manner of practice in the field of sheet metal manufacture all that is necessary is to provide the contact spots or projections as already described and then to assemble the pieces in an electric welding machine and weld them together as already set forth.

Insert E2

Sub. F'

What I claim as my Invention is:

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at a spot or spots only of their juxtaposed or opposite faces.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other, while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current, and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces, so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other, while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the

pieces are not welded together.

5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded separated from one another by areas of no union.

6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

7. The method of welding two pieces of metal together, consisting in superposing said pieces with their surfaces at which the union is to take place, superposed or presented to one another, pressing the pieces together, and passing a heating electric current from one to the other while, and localizing the heating current simultaneously in a number of distinct or separate spots of limited area, separated from one another sufficiently to secure a union of the pieces in a number of corresponding distinct spots surrounded by and separated from one another by comparatively distinct areas in which no union exists.

8. The method of uniting two pieces of metal, consisting in providing between their meeting surfaces a

number of projections, spaced apart as described, pressing the pieces together and passing an electric current through said projections while confining the welding area of such current to said projections and the areas immediately surrounding the same so as to leave distinct areas around between spots in which no welding shall be produced.

9. The method of fastening two plates of metal together at a multiplicity of distinct or separate points of welded union, consisting in providing between them a number of isolated contact spots adapted to pass an electric current from one to the other but so separated that the electric welds E4 will not extend into one another from one spot to the next E4, passing a heating electric current through such spots simultaneously and applying pressure as and for the purpose described.

10. The herein described method of electrically welding two plates or sheets of metal of any guage together by distinct spots of union disposed over their plane surfaces, consisting in providing a multiplicity of electrical contact spots coincident with the separated spots of union and disposed at such distances apart that there will be well-defined areas between spots through which the electric current will not flow, passing electric current from one plate to the other through said contact spots simultaneously and applying pressure as and for the purpose described.

11. The method of fastening two sheets of metal together, consisting in providing between them a number of isolated contact spots for the passage of the electric welding current, said spots being adatped to ini-

tially hold the plates apart and being separated from one another a sufficient distance to confine the welding to distinct areas or isolated spots, passing a heating electric current through a number of said contact spots simultaneously and pressing the plates together as and for the purpose described.

12. The method of fastening two plates of metal together, consisting in furnishing a surface of said plates with a number of projecting contact spots for the passage of welding electric current and disposed at such distances apart that on the application of pressure the welds will not run into one another, superposing said plates, passing a heating electric current from one to the other over said separated spots and applying the pressure to produce a spot-welding of the plates to one another as and for the purpose described.

13. The herein described method of fastening two pieces of metal together by providing each plate with a number of projecting contact spots on its plane surface disposed at such distances apart that the unions will not run into one another but will, nevertheless, firmly hold the plates together, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other through the spots and simultaneously applying pressure thus uniting the plates at a number of distinct points of welded union.

14. The method of uniting two sheets of metal face to face, consisting in indenting the material, super-

posing the plates with the points of the indentations engaged, passing an electric current from one plate to the other through said point-or points simultaneously, and applying pressure while confining the area of heating to welding temperature to a circumscribed area or spot to unite the pieces in a distinct spot or spots of small extent in the whole area of the opposed faces.

15. The herein described method of fastening two plates together at a multiplicity of distinct mechanically separated points of welded union, consisting in indenting each plate to form a number of projecting contact spots on the plane surfaces which are to abut, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other thereby forming a number of distinct zones or points of heated metal, heated to welding temperature, and applying pressure to complete the union of plates by a number of mechanically distinct unions.

16. Composite metal work, having its component pieces welded together at one or more spots localized on their meeting surfaces or portions so as to be separated from one another on said meeting portions by distinct areas which are unwelded.

17. Metal plates fastened together at their meeting portions by a number of distinct or isolated welds formed at spots of such restricted area and so separated from one another that when welding electric current is passed from one to the other at said spots, the metal between the spots will not be brought to plastic or welding condition.

18. Metal plates arranged face to face and fastened together on their plane surfaces by a number of distinct or isolated electric welds formed of the metal of said plates in spots separated from one another to such a distance that in passing the heating electric current from one plate to the other there shall be distinct areas in which no effective welding current can pass.

Sub. E7

19. Composite sheet metal work formed by a union of the component sheets at a multiplicity of distinct or isolated welds, comprising raised electric contact spots in the plane surfaces of the metal of said plates, said spots separated from one another a sufficient distance to localize the welding in distinct spots separated by areas in which there is no union.

D Erased Pr F

20. Articles of composite sheet metal manufacture, united at their plane surfaces at a number of spots of electrically welded union involving the material of said plates and separated from one another to such a distance that in passing current from one plate to the other simultaneously at the points where said spots are located, there will be distinct areas between spots practically unaffected by the current.

Insert-E8 E 8

21. Composite metal work consisting of superposed pieces secured together by a welding of the same on their opposed faces by distinct spots of welded union, isolated or separated from one another by unwelded portions of such faces.

Sub. E9

22. Composite sheet metal work having its component parts welded to one another on their opposed faces at a multiplicity of distinct or separate spots of electrically welded union, substantially coextensive in area with the restricted area of the path of the

Sub. E10 E10 Erased Per F

effective heating current so as to produce a welding in spots.

23. Metal pieces welded together in a spot or spots definitely located in and involving a portion only of their meeting surfaces as and for the purpose described.

REMARKS:

We submit herewith substitute specification and claims in the above-entitled case, together with an affidavit of the inventor, making oath to facts showing a completion of the invention in this country before the legal date of the foreign patent to Harmatta, cited by the Examiner as an anticipating patent.

We also submit an expert affidavit of Elihu Thomson, the inventor of the electric welding process, distinguishing the invention claimed by applicant from the invention as disclosed in the Hunter patent and in his own patent for electric riveting which has been cited by the Examiner.

The specification and claims now submitted have been drawn with a purpose of more fully and exactly bringing out the essential difference between the Rietzel invention and the Hunter invention or the invention in the Robb patent, and along the lines which led the Examiner having charge of this case when it was appealed, to consent to the remanding of it to him for further consideration, after a personal interview in

which the actual differences between the Rietzel and Hunter inventions were pointed out to and admitted by the Examiner. The gist of his objection to the allowance of the case at that time was that those differences were not sufficiently brought out in the claims appealed.

We think there can be no question as to the sufficiency of the specification and claims now submitted to distinguish the invention from the patents cited.

Applicant has made a valuable contribution to the art and one that has gone into very extensive use in the manufacture of sheet metal utensils. The invention marks a distinct step forward in the art and we are confident that the existence of an essentially novel invention clearly distinguishable from anything shown in the patents cited will be admitted by the Examiner. We may add that as to the Robb patent it is apparent that the patentee contemplated only the formation of a weld which would not be limited to a spot in the opposed or meeting surfaces but would spread and practically involve the whole of said opposed surfaces and would be coextensive in area with the cross-sectional area of one or both pieces taken on a line immediately back of the welded union or transverse to the line of welding pressure. It is true that Robb by a special expedient starts the heating at a point of comparatively small extent just as it had been started previously in the art by pointing the pieces. The ultimate union, however, was not limited in area or extent in the manner proposed by applicant, but was in fact a welded union of exactly the same kind as had been previously secured in the art by pointing the pieces.

Respectfully submitted,

(15) A. F. Rietzel By Townsend & Decker Atty's

1777

MAIL ROOM
NOV 30 1903
U.S. PATENT OFFICE.

Appn of A F. Rietzel

Metal Working

Filed Feby 24 1905. S N. 247081.

Specimen of Pulley

C F. Tischner Jr.

Notary Public.

Specimen attached to Affidavit cannot be furnished.

1978

MAIL ROOM
NOV 30 1908
U.S.PATENT OFFICE

IN THE UNITED STATES PATENT OFFICE.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:-

In the matter of the application of ADOLPH R. RIETZEL, filed Feb. 24th, 1905, S. N. 247,081 for Uniting Sheet Metal By Electric Welding.

AFFIDAVIT.

County of New York)
State of New York) ss

ADOLPH F. RIETZEL being duly sworn deposes and says that he is the applicant who filed the above entitled application for patent; that some time in June 1904 he successfully practised the invention in said application by uniting two halves of a sheet metal pulley in a electric electric welding machine at the shop of the Thomson Electric Welding Co., in Lynn, Mass.; that the piece of sheet metal herewith attached and marked:"specimen of pulley C. F. Tiedhenr Jr. .....N.P." is a duplicate of one of the halves of the pulley to which he at that time applied the invention; that the contact points or projections formed in the sheet metal were in the first instance made by filing the metal to leave the contact points or projections, indenting not being available at that time, but that in subsequent operations in which his invention was employed the projections were made by indenting the sheet metal, and that the invention was frequently practised by him successfully at the shop of said Company on a standard welding machine; that in conducting the operations on such machine he employed a pair of contacts fitted in the jaws of the

machine and formed at their outer ends so as to fit into the cup shaped portion of the halves of the sheet metal pulley to be welded, thereby supporting the two halves with the contact projections engaged with one another; the two halves being in contact by the projections while assembled in the machine, electric current was caused to pass through the two halves by the contact projections, and pressure was then applied in the usual way practised in electric welding by the standard machine in which the operation in question was conducted; the operations above recited as conducted by him were uniformly successful and demonstrated clearly that the invention was complete in all particulars, and that the said invention has been since practised on innumberable occasions in substantially the same way for uniting pieces of sheet metal such as the halves of sheet metal pulleys of the form shown in the exhibit and of other forms and of other sizes, many of much larger size than that of the exhibit; that he does not know and does not believe that the invention aforesaid has been in public use or on sale in this country, patented or described in a printed publication in this or any foreign country for more than two years prior to his application and that he has never abandoned the invention.

Adolph F. Rietzel

Subscribed and sworn to by the aforesaid Adolph F. Rietzel before me this 23d day of October 1908.

C G Tischner Jr

Notary Public.

SEAL

NOTARY PUBLIC, KINGS COUNTY,
CERTIFICATE FILED IN NEW YORK COUNTY.

1780

MAIL ROOM
DEC 2 1908
U.S.PATENT OFFICE

U.S.PATENT OFFICE Serial No.247,081 Paper No.1
DEC 3 1908 Letter
DIVISION 26

Examiner's Room,
No. 105.

New York, December 1st, 1908.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of A. F. Rietzel for Composite Metal Structure, filed Feb. 24, 1905, S. N. 247,081:

The expert affidavit referred to in the remarks accompanying our amendment of November 24th, 1908 was not filed with said amendment but will be forwarded to the Patent Office in a few days. We would request that action on the amendment be postponed until such affidavit is filed.

Very respectfully,

Townsend & Decker,

Atty's for

Applicant.

1781

U.S.Patent Office
DEC 10 1908
DIVISION IV.

U.S.PATENT OFFICE
DEC 11 1908
DIVISION 26

Serial No.247081 Paper No18
Affidavit

MAIL ROOM
DEC 9 1908
U.S.PATENT OFFICE

(Printed letter head omitted.)

New York, December 4th, 1908.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of A. F. Rietzel for Composite Metal Structure, filed February 24th, 1905, S. N. 247,081:

We file herewith the affidavit of Elihu Thomson referred to in the remarks accompanying our amendment of November 24th, 1908, and we request that action on the amendment be taken in accordance with ours of the first of December, 1908.

Very respectfully,

Townsend & Decker

1782

APPLICATION ROOM
DEC 9 1908
U.S.PATENT OFFICE

IN THE UNITED STATES PATENT OFFICE.

In the matter of the application of
Adolph F. Rietzel, for Electric Welding,
filed Feb. 24, 1905, S. N. 247,081;

AFFIDAVIT.

County of Essex / New-York, } ss--
State of Mass. / New-York, }

Elihu Thomson, being duly sworn, deposes and says that he is and has been for many years past the consulting engineer of the Thomson Electric Welding Co.;

That he is the originator and patentee of the process for electric welding now, and for many years last past, in extensive and commercial use, which process was patented to him by United States Letters Patent dated Aug. 10, 1886, Nos. 347,140, 347,141;

That he is familiar with said process in all of its aspects, details and applications and has practised it himself on innumerable occasions and is the inventor and patentee of numerous modifications and applications ofthe process and of machinery and apparatus for carrying the same into effect;

That he is familiar with the process of electric welding set forth in the above entitled application of A. F. Rietzel for uniting sheets of metal together by what has been known as the "spot welding process" and which forms a practical substitute for the riveting of plates together or for other mechanical expedient for fastening them together face to face;

That one of the methods of uniting pieces of metal together by riveting and for which the aforesaid spot welding process forms a valuable substitute was patented by him by United States Letters Patent dated Jan. 8, 1889, Patent No. 396,015;

That he has read and is familiar with the patent of R. M. Hunter, No. 690,958 for method of electric welding; that said process of welding as set out in said patent is distinctly different from the "spot welding process" aforesaid, in that the purpose of the inventor and patentee, Hunter, was clearly to make a lap joint between two pieces of metal by uniting them over substantially the whole area of the lapping surfaces; that there is nothing in said patent, by implication or otherwise, hinting at the uniting of the lapped surfaces by spots only of welding but that the whole purpose of the patentee, as disclosed by the specification of the patent was to produce a joint in which the welding area is substantially coextensive with the area of the overlapping or opposed meeting surfaces;

That in addition to the explicit statements in the specification the Fig. 4 of the drawing evidences the clear intention of the patentee to make a joint which would not be a spot welding joint but a joint practically coextensive in area of actual union with the area of the overlap, for in said figure it may be seen that the dotted circles showing the merging of the welds or areas of fusion in a line transverse to the strips of metal also are of a diameter practically measured by the extent of the overlap;

That if the metal be heated as the patentee proposes so as to form small lakes of molten metal which will quickly spread and to unite, then the areas of union which

the patentee presupposes in his Fig. 4 to be distinct circular areas would spread irregularly and there would not even be any triangular small areas near the edge of the overlap such as he has supposed would exist; that the production of a heated joint by the formation of liquid pools between the projections, as proposed in the patent, is impractical for the reason that the metal could not be heated to the degree of liquidity without danger of melting the whole sheet itself and that on the other hand if the projections be placed so near together as to permit the welds to unite by the spread of the merely plastic portions so as to merge into one another, the process would be in no substantial way distinguishable from any case of plane lap welding by the electrical process as practised for many years previously to the granting of said patent;

That in the invention of Mr. Rietzel aforesaid, the object and essential operation are entirely different from that of the Hunter process or invention, for the reason that there is no purpose in the Rietzel invention of forming a lap weld continuous over thewhole opposed surfaces of the sheet metal pieces but on the contrary the purpose is distinctly to limit the welding to a mere spot or spots, forming, in effect, a substitute union for that made heretofore, by perforating the plates at the spot or spots of union and then inserting a rivet and heading down said rivet;

That in the Rietzel invention, in other words, themechanical union of the plates is not over the whole area of the opposed or meeting surfaces but at a number of isolated places which are, strictly speaking,

spots, inasmuch as the welding portions of the plate form ~~its~~ portions only of their meeting surfaces and are separated from one another over large areas by disunited portions, said disunited areas being anything desired, consistent with the desired strength of the ~~x~~ composite piece. It is therefore possible and practicable to get the desired strength of union with the expenditure of much less labor and electric energy than would be the case either by the riveting process or by the attempt to start the welding at a number of points sufficiently near together to cause merging of them into a continuous or unbroken area of welded union such as lies at the foundation of the Hunter process.

In other words, in the Rietzel invention there is no such thing as the flowing of the zones of heated metal together and no such thing as a lap joint, the area of union in which is coextensive with area of the overlap as shown and described in the Hunter patent.

The spot welding as contemplated by the Rietzel invention is entirely different in conception and application and affords a welding substitute for a riveted union. There is no welding over the areas between the spots at which the heating current starts and in fact there may be such want of contact and union over such areas, as to allow a liquid to leak through between the plates whereas in the Hunter process the object, as set out in his specification, is to form a joint that shall be liquid-tight.

The accompanying specimen of work marked "Rietzel Exhibit #1 John A. McMannus, Jr. N. P." and which I further identify by marking my initials "E.T." upon

the card attached is a sample of work made according to the Rietzel invention.

The accompanying exhibit marked "Rietzel Exhibit #2 J. A. McManus, N. P." and also with my initials "E. T." which I have placed upon the card is a fair sample of the result of an attempt to lap weld two sheets by the process which involves the formation of small lakes of molten metal mentioned in the Hunter specification.

The accompanying exhibit marked "Rietzel Exhibit #3 J. A. McManus, N. P." and also with my initials "E.T." is a specimen of a lap welding made by forming initial projections at such distances apart that cold metal will be left between said projections and the union will be therefore by a line of separate welded points in contradistinction to the continuous welds made by using a large number of projections placed in close proximity to one another so that they will run into a continuous line of weld, in which case, however, a much greater amount of power will be required and if the attempt be made to allow rivers of melted metal to be formed the result would be a probable burning of the metal as shown in Exhibit #2.

My prior patent #396,015 discloses the use of rivets and makes mention of welding but the only possible welding that could be produced by that process would be possibly some sticking of the edge of the perforation in the metal sheet to the side of the rivet which is a mere incident of the invention and there is no welding of the superposed plane surfaces or opposed

faces of the plates to one another by welds disposed over such plane faces.

Elihu Thomson

Subscribed and sworn to before me
this 30th day of November, 1908.

John A. McManus, Jr.
Notary Public

SEAL

1788

Div. 26 Room 105 — 2-260 — Paper No. 19.

Address only "The Commissioner of Patents, Washington, D. C." — All communications respecting this application should give the serial number, date of filing, and title of invention.

PH

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., December 14, 1908.
MAILED

Adolph F. Rietzel,

Care, Townsend & Decker,

141 Broadway, New York, N. Y.

Please find below a communication from the EXAMINER in charge of the application of your

for Method of Electric Welding, filed Feb. 24, 1905, Serial No. 247,081.

E. B. Moore
Commissioner of Patents.

In response to amendment of November 30, 1908.

Claim 1 is rejected as unpatentable over Benardos et al, 363,320, May 17, 1887, Class 219, Sub-class 15, or either of the French patents to Egel, 336,187, and 335,889, both in Class 219, Welding.

Claim 2 is objectionable because xf the expression "confining the flow of current to said spots" implies the use of apparatus such as a pointed electrode. The claim is therefore misleading as applied to the method described by the applicant. A similar objection is made to the expression "localizing the pressure in and confining the flow of current", in claim 4; "localizing the heating current", in claim 7; "confining the welding area of such current", in claim 8; and "confining the area of heating", in claim 14.

Claims 2 to 7, inclusive, are rejected on either of the French patents cited above.

Claims 9 and 11 are rejected as differentiating from Hunter of record only by a negative limitation.

Claim 17 is objectionable as an article claim inasmuch as the last portion of the claim beginning "that when the welding electric current etc" relates to the method of forming the article. A similar objection is made to claims 18, 19, 20 and 22.

Claims 16, 17, 18, 20, 21, 22 and 23 are rejected as presenting nothing patentable over Benardos, cited above, or either of the French patents cited above.

The article defined by claim 19 is not the article which would result from the process set forth in claims 4 and 8 and is a different species from the article defined by claim 23. Claim 19 defines an article in which the plane surfaces are not in contact, whereas in the article defined by claim 23 and resulting from the process set forth in claims 4 and 8 the plane surfaces are in contact. Restriction to a single species is therefore required.

HL A. P. Shaw Ex

1790

MAIL ROOM
MAR 13 1909
U.S.PATENT OFFICE

Serial No.247,081 Paper No. 2
Affidavit

(Printed letter head omitted.)

New York, March 12, 1909.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of A. F. Rietzel for Composite Sheet Metal Structure, filed February 24, 1905, S. N. 247,081:

We are sending you by Adams Express the specimens referred to in the affidavit of Adolph F. Rietzel dated February 18, 1909 and filed with an amendment in the above case dated March 3rd, 1909.

Very respectfully,

Adolph F. Rietzel

By Townsend & Decker

Attys.

1791

MAIL ROOM
MAR 13 1909
U.S.PATENT OFFICE

U.S.PATENT OFFICE
MAR 15 1909
DIVISION 26

IN THE UNITED STATES PATENT OFFICE.

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In the matter of the application for patent of Adolph F. Rietzel, S. N. 247,081, filed February 24th, 1905, for Electric Welding:

AFFIDAVIT.

County of New York)
State of New York) ss:

ADOLPH F. RIETZEL, being duly sworn, deposes and says, that he is the applicant that filed the above entitled application for patent;

That prior to the 18th day of February, 1904, he repeatedly, successfully practised the method of fastening two sheets of metal together face to face by welding them at spots in their meeting surfaces by confining the heating electric current passed from one plate to the other in such spots and localizing the welding pressure at said spots, as claimed broadly in said application;

That the work of so uniting such sheets of metal was done at the factory of the Thomson Electric Welding Company at Lynn, Massachusetts, on a Welding Machine of a commercial type known as type 10 A Welder;

That said Machine was the same in construction as the machine known as type 5 A Welder but of larger size and was identical with that shown on the attached

page removed from a catalogue of the Thomson Electric Welding Company, which page is identified and marked "Page of Catalogue, D. M. Edsall, N. P.";

That the accompanying pieces of work marked "Specimen No. 1, D. M. Edsall, N. P." and "Specimen No. 2, D. M. Edsall, N. P." are duplicates of work so done by him on that Machine prior to the 18th day of February, 1904, but that the original specimens were not preserved;

That in doing such work he employed a pointed electrode, the same in form as the accompanying electrode marked for identification "Welding Electrode, D. M. Edsall, N. P.", which Electrode was clamped in one of the holders of the machine and was used to apply the localized pressure and heating current to the plates which were welded together at spots in their superficial area, the opposite or backing electrode being a block of metal which was flat and of a superficial area, approximating the area of the plates which were welded together and which opposite electrode was clamped in the opposite holder of the machine;

That in this operation the two plates superposed upon one another were inserted between said electrodes and the pressure and heating current localized as claimed were applied by forcing the pointed electrode against the outside face of the plates and pressing them between said pointed electrode and the opposite flat electrode, current being at the same time passed from one electrode to the other and pressure being applied by employing the usual devices forming a part of the machine and used in the ordinary operation of the machine for applying welding pressure to

the work;

That work was repeatedly and successfully done in this manner upon various sizes and pieces of metal plates, none of which however, are now in existence so far as affiant has been able to discover;

That the work done by him as aforesaid, demonstrated the complete success of the operation and that metal plates could be successfully and firmly united together by distinct or isolated electric welds forming welded spots of union in their meeting faces and constituting in effect a successful substitute for a union of the same by a number of rivets.

Adolph F. Rietzel

Subscribed and sworn to before me this 18th day of February, 1909.

David M. Edsall
Notary Public
N.Y. Co.

SEAL

1794

Page of Catalogue

SOME ADVANTAGES OF ELECTRIC WELDING.

1. **The Homogeneous Nature of the Weld:** When the weld is made, the structure of the metal at the joint *is the same* as elsewhere.

2. **Absolute Control Over the Heat:** By simple appliances the metal can be held at any temperature desired for any length of time, and the heat increased or decreased at will.

3. **The Welding Process can be Continually Watched:** The metal while heating is visible instead of being covered with coal or hidden by flame, as in the forge process.

4. **Avoiding Flaws:** THE UNION COMMENCES AT THE INTERIOR OF THE JOINT, and not in an uncertain way; consequently, any possible flaw can be easily discovered and prevented.

5. **Rapidity:** The process is almost instantaneous with small sections, while with larger sizes it requires but little time, depending upon the horse-power used.

6. **Flexibility of the Process:** Applying as it does to various kinds and forms of metal, including those which have heretofore been united only by brazing.

7. **Accuracy:** The welds are kept in perfect line by the clamps during the operation.

8. **Localization of Heat at the Weld:** Consequently, no heating effect elsewhere.

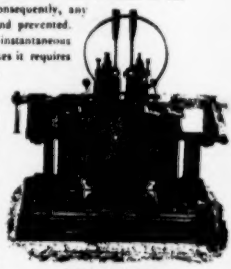
9. **Cleanliness:** The apparatus can be used in any convenient or desirable place and makes no dirt or litter.

10. **No Blistering or Scaling:** The heat is confined to the welded joint.

11. **Lighting:** By using the necessary transformer, incandescent lamps can be used when the current is not required for welding purposes.

[redacted]: Simple and easy in operation; the current used in [redacted] render shocks, even of the slightest kind, impossible.

[redacted] labor and time; also, in material.



TYPE 34 WELDER Cover off.
For light irons, straight-away, angle or miscellaneous work.
Maximum Capacity, 30 [redacted] iron or steel.
Horse-power, 5 to 25 000 volts.
Approximate Weight 525 lbs.

Page of Catalogue

Did you ever stop to think what you can do with electric welding that you can't do with any other welding method?

D. M. Edgar
W. P.

MAIL ROOM
MAR 13 1909
U.S.PATENT OFFICE DIVISION 26

U.S.PATENT OFFICE Serial No.247,081 Paper No.23
MAR 16 1909
"E"

U.S.PATENT OFFICE
MAR 15 1909
DIVISION IV.

New York, March 3rd, 1909.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of Adolph F. Rietzel for Composite Sheet Metal Structure, filed Feb. 24, 1905, S. N. 247,081;

Please amend as follows:

Erase paragraph beginning at the third line from the bottom on page 1 of the substitute specification filed November 24, 1908 and ending on line 2 of page 2, and substitute the following:

"Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots.

By the terms "weld" and "electric weld" as herein employed, I refer to that process of welding in which the metal is brought to plastic condition by passing an electric current from one to the other of two pieces where they are in contact and is welded while in such condition by the application of pressure, as contra-distinguished from a process of uniting metals, which is described in a Patent to Bernardos, No. 363,320, dated May 17, 1887, and in which the union is effected by melting the metal by an arc

P' and which is different from "welding" in the ordinary sense of the term as applied to metal manufactures, in that the metal is heated beyond the point of plasticity and pressure is not employed."

Erase beginning with line 13, page 2, to the end of line 23, same page and substitute:

P² "A weld formed according to my invention is distinguished however from such prior welds by the fact that the opposed surfaces are welded together in spots only, theheating electric current being localized or confined in any desired way to such spots so that the major portion of the opposed surfaces will not be involved in the welding, although they may, after the completion of the operation, lie in contact with one another or very close together."

Erase claim 1 and substitute:

P³ "1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots."

In claim 2, before "passing", line 5, insert: "and".

Line 6, same claim, erase the word "and" and substitute: "while".

Claim 4, line 5, erase the word "and" before the word "localizing" and substitute: "while",

Claim 4, line 4, before "passing" insert "and".

In claim 4 erase the words "and the areas immediately surrounding the same".

To claim 6 add the following: "completely surrounding said spot".

In claim 7, before "passing", line 5, insert "and".

In claim 7, line 6, change "and" to "while".

In claim 8, line 5, erase the word "and" to gether with the comma immediately preceding the same and substitute: "while".

In claim 8 erase the words "and the areas immediately surrounding the same".

In claim 9 erase the words "will not extend into one another from one spot to the next" and substitute: "will be separated from one another by unwelded areas".

In claim 11 erase the words "spots separated by well defined areas of no welding" and substitute: "isolated spots".

Before the word "spots", line 9, claim 11, insert "contact".

In claim 14 after the word "spot", line 9, insert "entirely surrounded by unheated areas".

Erase claim 16 and substitute:

E5 Erased Per F

"16. "Composite metal work having its component pieces welded together in spots onlyon their opposed or meeting surfaces and by pressure applied at said spots while in plastic condition, thus producing a union of the metal in spots separated from one another by distinct areas which are unwelded, as and for the purpose described."

Erase claim 17 and substitute:

E6 F P

16 "17. "Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting backs portions of the metal plates, the back of said unaltered in their metallic condition plates being practically unaffected and the spots on the meeting surfaces being separated from one another by distinct unwelded areas".

Erase claim 18 and substitute:

E7 Sub. F3

"18. Metal plates arranged face to face and fastened together on their plane surfaces by a number of distinct or isolated pressure formed electric welds involving metal of said plates heated to welding temperature on their meeting sides only and at spots on said surfaces separated from one another by distinct surrounding areas of unwelded metal, as and for the purpose described."

In claim 20, after "plates", line 4, insert:

E8 Per F

"heated to the welding temperature on the meeting portions or surfaces of said plates only".

Erase claim 21 and substitute:

E9 Per F

"21. Composite metal work comprising superposed plates secured together by an electric weld-

sur
ing of the same on their opposed faces by distinct spots of welded union formed by pressure and reduction of the metal at such spots to plastic condition, said spots being isolated or separated from one another by distinct surrounding areas unwelded on such meeting faces."

In claim 22, line 2, erase the words "welded to one another on their opposed faces" and substitute: "welded by the material of their opposed faces only reduced to welding temperature and".

Per F

Erase claim 23 and substitute:

"23. Metal plates electrically welded together by heating current and pressure located in a spot or spots involving the material of their opposed or meeting portions and surrounded by distinct areas of unwelded union, as and for the purpose described."

"24. Sheet metal plates electrically welded together by heating current and pressure at a spot or spots definitely located in and involving the heated material of the opposed or meeting portions of the plates entirely surrounded by distinct areas unwelded, as and for the purpose described."

At the end of the specification insert the following:

"The product of the foregoing process is readily distinguishable from that produced by an electric arc applied at the back of two plates to be joined as proposed in the before mentioned patent of Bernardos by the fact that in my improved product there is no burning of the metal on the back

of the plate and the back surface will not be marred but will, when the process is properly conducted, retain a smooth finish, particularly adapting the work for subsequent enameling. The improved product also possesses the advantage, when applied to the sheet metal, that the spots of welding being located within the edges of the meeting surfaces will not show and will not mar the finish of the completed work. The product is also superior to that produced by a riveting of the plates in that there are no rivet heads to mar the finish of the back or outer surface of the metal".

B12

REMARKS:

We file herewith an affidavit establishing completion of the invention on applicant's part prior to the dates of the French patents cited by the Examiner in his last official letter.

The formal amendments to the method claims are those which were agreed upon at the conference with the Examiner on the 26th ultimo, and as we understand, remove the objections raised by the Examiner.

The terms used by applicant are broad and intended to be broad and define the process in the broad terms commensurate with the extent of the invention and they cannot be held to be misleading because they may be of such scope as to cover variations of the broad process claimed. There may be still negative expressions in some of the claims but they are not used in a way that we think can be

held to be objectionable for they express in the most direct and clearest manner possible one of the essential differences between applicant's process and the Hunter process. For instance, in Hunter there are no unwelded areas between the initial contact spots and this is one of the characteristic differences best expressed it seems to us in the terms that have been employed.

Applicant has claimed not only the process but the product of that process. The process is unquestionably different from that of Bernardos which, as stated to the Examiner in the course of the interview referred to, is not a true welding process, inasmuch as it involves the reduction of the metal to fluidity instead of simply to plastic condition, and does not employ pressure.

The term "welding" is not used by the patentee at all, and we presume advisedly. It would seem that there are some publications in which the Bernardos process is spoken of as a welding process. The term "welding", so used, is unquestionably a misnomer. In order that, however, there may be no ambiguity in regard to what applicant claims as his invention we have inserted the above reference to the Bernardos patent which makes the distinction obvious and operates as a disclaimer.

The improved product resulting from applicant's process is readily distinguishable by simple inspection from anything that could be produced by the Bernardos arc process. In that process there is necessarily a burning of the outside surfaces of the metal for the arc is applied to the outside,

the heat is localized on the outside, and the melting of the plates on their meeting surfaces can only take place when the fluid condition produced by the arc is extended through the whole body of the metal to the inner surface. There is naturally a burning and roughening of the metal on the outer surface which mars the finish and makes it apparent that the arc process has been used. No such marring and burning exist in applicant's product and to one skilled in the art it would be manifest that the product has resulted from the essential process claimed and recognized by the Examiner as a patentable process. The improved product of the improved process being clearly distinguishable as a product from, and manifestly superior to that of Bernardos, it is clear that the product as well as the process claimed should be allowed.

Respectfully submitted,

Adolph F. Rietzel

By Townsend & Decker

Attys.

Div. 26 Room 1[illegible]. 2-268 Paper No. 22.

Address only "The Commissioner of Patents, Washington, D. C."

All communications respecting this application should give the serial number, date of filing, and title of invention.

PH

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., April 9, 1909.
MAILED

Adolph F. Rietzel,

Care, Townsend & Decker,

141 Broadway, New York, N. Y.

Please find below a communication from the EXAMINER in charge of the application of your

for Method of Electric Welding, filed Feb. 24, 1905, Serial No. 247,081.

c4—981

E. B. Moore
Commissioner of Patents.

In response to communication of March 13, 1909.

The word "spot" does not occur in line 9 of claim 14; consequently the matter which the applicant has directed to be inserted after the word "spot" in line 9 of claim 14 has not been entered. Inasmuch as claim 14 has not been amended, the objection to this claim, made in the third paragraph of the office letter of Dec. 14, 1908, has not been overcome, and this objection is repeated.

In claims 16 and 18 to 24, inclusive, the article is defined at least partly by themethod of making it. These claims are therefore objectionable.

In line 4 of claim 17, should not "back" be changed to backs?

Throughout the prosecution of this case the more specific claims have read only on Fig. 2 (see claim 7 of the original specification and see present claim 15). The applicant will therefore not be permitted to retain in the case article claims which will not read upon the article produced by the process illustrated in Fig. 2. It is not believed that claim 17 will read upon the article produced by the method illustrated in Fig. 2 because it does not appear that the backs of the plates would be unaffected in this process. The cancelation of claim 17 is therefore required.

In claim 19 it is not clear what the following phrase refers to, viz. "comprising raised electric contact spots etc.".

The language of claim 19 implies that the plane surfaces of the metal of the plates are not in contact. Therefore the article defined by this claim will not result from the processes set forth by some of the other claims in the case, e. g. claims 4 and 8, in which it is specified that the plane surfaces of the metal plates meet. This claim is also alternative to claims 16, 17 and 18. Restriction to a single species is required.

The word "reduced" in the phrase "reduced to welding temperature" in the insertion in line 2 of claim 22 is evidently an inappropriate term.

A. P. Shaw Ex

HL

U.S. PATENT OFFICE APPLICATION ROOM Serial No.247,081 Paper No.23
MAY 7 1909 MAY 7 1909
DIVISION 26 U.S.PATENT OFFICE "P"

New York, May 6th, 1909.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of Adolph F. Rietzel for Uniting the Component Parts of Composite Sheet Metal Structure, filed February 24, 1905, S. N. 247,081;

In reply to the Examiner's letter dated April 9, 1909, please amend as follows:

Erase matter inserted by the last amendment at the end of the specification and substitute the following:

"The product of the foregoing process is readily distinguishable from that produced by melting down the metal of the pieces from the back at spots as proposed in the before mentioned patent of Bernardos in that there is no substantial alteration of condition of the metal back of the welds appearing as a burning, roughening or disintegration of the material by the very great heat of the electric arc employed for melting down the metal, and by the further fact that the unions themselves in the material of the juxtaposed or opposite faces have the characteristics of a true weld produced by bringing the metal to welding temperature only and applying pressure, so that the pieces are solidly and firmly united and cannot be readily torn apart as they could be if the metal at the spots has been melted down under

the high temperature of the electric arc.

"The product in the form of sheet metal is further particularly useful for sheet metal ware since the outer or exposed surface of the metal will have the smooth and practically unaltered finish of sheet metal and said surface will not be substantially marred when the process is properly conducted, excepting for the presence of such infrequent small depressions as might remain from the previous indentation of the metal from the back when, as hereinbefore described, an indenting of the metal may be resorted to.

"The product in sheet metal also possesses the advantage that the spots of welding when being located within the edges of the meeting surfaces ~~or each entirely surrounded by unwelded areas~~, will not show. The produce is also superior to that produced by riveting of the plates in that there are no rivet heads to mar the finish of the back or outer surfaces of the metal."

Erase "separated from one another" in claim 5, line 8, and substitute "entirely surrounded".

In claim 8, line 8, erase "between" and substitute "around".

In claim 14 l. 3 change "point" to "points"

In claim 14, line 8, after the word "spot" first occurrence insert "entirely surrounded by areas unheated to welding temperature".

In claim 14, l. 8 cancel "point or"

Erase claim 16.

In claim 17 erase the word "unaffected", line 8, and substitute "unaltered in their metallic

condition". In line 4 of the same claim change the word "back" to "backs".

Change the ordinal of claim 17 to 16.

Erase claims 18 to 24 inclusive and substitute:

"17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

"18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

"19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described."

REMARKS:

The applicant, by the foregoing, has confined his claims to the product to four claims each of which, it is thought, clearly avoids the technical objection raised by the Examiner and an immediate allowance is respectfully requested.

Respectfully submitted,

A. F. Rietzel

By Townsend & Decker

Attorney.

1809

Div. 26 Room 105. 2-200 Paper No. 24.

Address only "The Commissioner of Patents, Washington, D. C."

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., May 10, 1909.
MAILED

Adolph F. Rietzel,

Care, Townsend & Decker,

141 Broadway, New York, N.Y.

Please find below a communication from the EXAMINER in charge of the application of your

for Method of Electric Welding, filed Feb. 24, 1905, Serial No. 247,081.

E. B. Moore

Commissioner of Patents.

In response to communication of May 7, 1909.

This case appears to be ready for issue, but in view of a possible interference, action is withheld until June 1, 1909, at which time applicant is requested to call the case up for action.

A. P. Shaw Ex

HL

1810

MAIL ROOM
MAY 28 1909
U.S.PATENT OFFICE DIVISION 26.

U.S. PATENT OFFICE 247,081 Paper No. 25
MAY 29 1909

Letter

New York, May 27, 1909.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of A. F. Rietzel for Method of Electric Welding, filed February 24, 1905, S. N. 247,081:

It is requested that action upon this case in its present status be suspended for a period of twenty days from June 1st, 1909.

Very respectfully,

Townsend & Decker

Attorneys for Applicant.

1811

Div. 25 Room 10[illegible].

Address only "The Commissioner of Patents, Washington, D. C."

2-260

Paper No. 26.

All communications respecting this application should give the serial number, date of filing, and title of invention.

PH

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., May 29, 1909.
MAILED " " "

Adolph F. Rietzel,

Care, Townsend & Decker,

141 Broadway, New York, N. Y.

Please find below a communication from the ***EXAMINER*** *in charge of the application of* your for Method of Electric Welding, filed Feb. 24, 1905, Serial No. 247,081.

E. B. Allsop

Commissioner of Patents.

6—1811

In response to communication of May 28, 1909.

In compliance with the request contained in the communication mentioned above, action on this case is suspended until June 21, 1909, at which time applicant is requested to call the case up for action.

A. P. Shaw Ex

HL

1812

MAIL ROOM
JUN 16 1909
U.S. PATENT OFFICE DIVISION 26.

U.S.PATENT OFFICE
JUN 18 1909

247,081 Paper No. 2
"G"

New York, June 15th, 1909.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of Adolph F. Rietzel for Uniting the Component Parts of Composite Sheet Metal Structures, filed February 24, 1905, S. N. 247,081;

In reply to office letter dated April 9, 1909, please amend as follows:

In the last paragraph of the matter substituted at the end of the specification by amendment filed May 7th, erase the words "being located" and substitute "when located". G

In the same paragraph erase the words "or each entirely surrounded by unwelded areas".

In claim 7, line 11, erase the word "comparatively".

REMARKS:

It is respectfully requested that the above amendment be approved and that action with regard to the probable interference be further postponed until July 10th.

Respectfully submitted,

A. F. Rietzel

By Townsend & Decker

Atty's

1813

Div. 26 Room 105.

Address only "The Commissioner of Patents, Washington, D. C."

2-260

Paper No. 28.

All communications respecting this application should give the serial number, date of filing, and title of invention.

PH

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON, D.C., June 19, 1909.
MAILED " " "

Adolph F. Rietzel,

Care, Townsend & Decker,

141 Broadway, New York, N. Y.

Please find below a communication from the EXAMINER in charge of the application of your

for Method of Electric Welding, filed Feb. 24, 1905, Serial No. 247,081.

E. B. Moore

Commissioner of Patents.

In response to communication of June 16, 1909.

In compliance with the request contained in the communicati mentioned above, and in accordance with the oral direction of the Assistant Commissioner of Patents, action on this case is suspended until July 21, 1909. No consideration will be given to any request for further postponement.

Applicant is requested to call the case up for action afte July 21, 1909.

A. P. Shaw Ex

HL

1814

APPLICATION ROOM
JUN 23 1909
U.S.PATENT OFFICE

U.S.PATENT OFFICE
JUN 23 1909
DIVISION 26

247,081 Paper No. 29
"H"

New York, June 19th, 1909.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

In the matter of the application of A. F. Rietzel for Uniting the Component Parts of Composite Sheet Metal Structures, filed February 24th, 1905, S. N. 247,081:

Please amend as follows:

In line 11, page 2, of the amendment dated November 24th, 1908, erase "welding" and substitute "uniting". H

In the last line of claim 3 erase "fusion and welding" and substitute "union".

Add the following claim 2o:

H' T.& D.

"20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points."

Respectfully submitted,

A. F. Rietzel

By Townsend & Decker

Attorneys.

1815

ADDRESS ONLY THE COMMISSIONER OF PATENTS, WASHINGTON, D. C.

2—181

Serial No. 247,081.

K.O'D.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

Adolph F. Rietzel, Assor. WASHINGTON, D.C., June 24, 1909.
% Townsend & Decker,
#141 Broadway, New York, N. Y.

Sir: Your APPLICATION for a patent for an IMPROVEMENT in Uniting the Component Parts of Composite Sheet Metal Structures, filed Feb. 24, 1905 has been examined and ALLOWED.

The final fee, TWENTY DOLLARS, must be paid not later than SIX MONTHS from the date of this present notice of allowance. If the final fee be not paid within that period, the patent on this application will be withheld, unless renewed with an additional fee of $15, under the provisions of Section 4897, Revised Statutes.

The office delivers patents upon the day of their date, and on which their term begins to run. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will require about four weeks, and such work will not be undertaken until after payment of the necessary fee.

When you send the final fee you will also send, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR and TITLE OF INVENTION AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If you desire to have the patent issue to ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of FIVE CENTS EACH. The money should accompany the order. Postage stamps will not be received.

Final fees will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

Respectfully,

E. B. Moore.

Commissioner of Patents.

IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

.....

.....

.....

6—1911

1816

$20-RECEIVED
JUN 24 1909 H
CHIEF CLERK U.S.PATENT OFFICE

2—327.

MEMORANDUM

OF

FEE PAID AT UNITED STATES PATENT OFFICE.

(Be careful to give correct Serial No.)

Serial No. 247,081 191

INVENTOR:

Adolph F. Rietzel

PATENT TO BE ISSUED TO

Thomson Electric Welding Co.

NAME OF INVENTION, AS ALLOWED:

Uniting the Component Parts of Sheet Metal Structures

DATE OF PAYMENT:

June 24, 1909

FEE:

$20.00 (Final)

DATE OF FILING:

Feb. 24, 1905

DATE OF CIRCULAR OF ALLOWANCE:

The Commissioner of Patents will please apply the accompanying fee as indicated above.

Townsend & Decker
Attorney.

SEND PATENT TO

Townsend & Decker

141 Broadway

N. Y.

6—1846

1817

ADDRESS ONLY THE COMMISSIONER OF PATENTS, WASHINGTON, D. C.

2—191

SERIAL No. 247,081

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE
WASHINGTON, D.C., June, 25, 1909

Adolph E? Rietzel, Assor,

PATENT WILL ISSUE
JUL 20 1909

c/o Townsend & Decker,
141 Broadway,
New York, N. Y.

Sir:

You are informed that the final fee of TWENTY DOLLARS has been received in your application for

Improvement in

Uniting the component parts of composite sheet metal structures,

Date of receipt

June 24, 1909

Very respectfully,

E. B. Moore.

Thomas Ewing

Commissioner of Patents.

6—1784

1818

INTERFERENCE.

Interference No. 31792 *Paper No.* 30

Name, Adolph F. Rietzel

Serial No. 247,081

Title, Uniting the Component Parts of Composite Sheet Metal Structures.

Filed, Feb. 24, 1905

Interference with Johann Harmatta.

DECISIONS OF

Primary Examiner, ... *Dated,* .....

Ex'r of Interferences, Adverse *Dated,* Aug. 7/12.

Board, ... *Dated,* .....

Commissioner, ... *Dated,* .....

REMARKS:

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

1819

Examiner of Interferences

Apr. 14, 1910.

2—213. VCC Paper No. 2 31

[INTERFERENCE.]

DEPARTMENT OF THE INTERIOR.

(Copies mailed patentee and assignee.)

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

U.S.PATENT OFFICE
INTERFERENCE DIVISION
APR 26 1910
MAILED

....., 190..

Adolph P. Rietzel, (Assor to Thomson Electric Welding Company, of Lynn, Mass., a corp, of Maine.)

c/o Townsend & Decker,

141 Broadway, New York City.

Please find below a copy of a communication from the Examiner concerning your application for "Uniting the Component Parts of Composite Sheet Metal Structures", filed Feb. 24, 1905, Serial No. 247,081, Pat'd July 20, 1909, Patent No. 928,701.

Very respectfully,

Room No. 105.

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

E. B. Moore

Commissioner of Patents.

31792

Your case, above referred to, is adjudged to interfere with others, hereafter specified, and the question of priority will be determined in conformity with the Rules.

The statement demanded by Rule 110 must be sealed up and filed on or before the 27 *day of* JUN 1910 *, 190..., with the subject of the invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is*

INVENTION.

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

3. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

4. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

5. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only,

each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

6. Composite material work having its component pieces welded together in spots only involving the material of their opposed contacting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

7. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

8. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

The interference involves your patent above identified, and

An application for "Electric Welding", filed by Johann Harmatta, whose post office address is Szepesvaralja, Hungary, and whose attorneys are O. E. Duffy & Son, of 612 F Street, N. W., Washington, D. C.

The relation of the counts of the interference to the claims of the respective parties is as follows:

Counts:	Rietzel:	Harmatta:
1	1	2
2	5	3
3	6	4
4	16	5
5	17	6
6	18	7
7	19	8
8	20	9

If the interference is decided against Harmatta all the claims now in the case will be rejected as not patentable over the issue.

A. P. Shaw Ex

Van Nest

1821

Div. 3 Room 13 — 2-260 — Paper No. 32

(Address only "The Commissioner of Patents, Washington, D. C.")

All communications respecting this application should give the serial number, date of filing, and title of invention

Jun. 12, 1911

(Copies sent patentee and assignee)

DEPARTMENT OF THE INTERIOR

RAH

UNITED STATES PATENT OFFICE

WASHINGTON

U.S.PATENT OFFICE
INTERFERENCE DIVISION
JUN 13 1911
MAILED

Adolph E. Rietzel,
C/o Townsend and Decker,
149 B'way, New York City.

Rietzel
v
Harmatta.

#31792.

Please find below a communication from the EXAMINER in charge of the application of your

247,081, filed Feb. 24, 1905:----

Method of Electric Welding.

21792

E. B. Moore.
Commissioner of Patents.

6--9631

The following counts have been added to the above entitled interference:----

9. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

10. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

11. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

The preliminary statement required by Rule 110, as to the added counts only, should be filed on or before AUG 14 1911

The relation of the added counts of the interference to the claims of the respective parties is as follows:---

Counts	Rietzel	Harmatta
9	2	10
10	3	11
11	4	12

Wm J Rich,

Examiner, Division 3.

$10- REC'D
JUN 12 1915 Ck A
C.C.U.S.PAT.OFFICE

(Printed letter head omitted.)

NEW YORK June 11th 1915.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

We enclose herewith Disclaimer to the United States patent of Adolph F. Rietzel for Uniting the Component Parts of Composite Sheet Metal Structures No. 928,701, dated July 20th 1909.

We also enclose herewith our check for $10.00 to cover the government fee.

Very respectfully,
Townsend & Decker.

FBT/IL

Enc.

1824

MAIL ROOM
JUN 12 1915
U.S.PATENT OFFICE

Hon. Commissioner of Patents,

Washington, D. C.

DISCLAIMER.

Your Petitioner, the Thomson Electric Welding Company, a corporation organized and existing under the laws of the Commonwealth of Massachusetts, respectfully represents:

That your Petitioner, the Thomson Electric Welding Company, is the present owner of United States Patent No. 928,701, for Uniting the Component Parts of Composite Sheet Metal Structures, issued July 20th 1909, to the Thomson Electric Welding Company, a corporation duly organized under the laws of the State of Maine as assignee of Adolph F. Rietzel;

That your Petitioner has reason to believe that through inadvertence, accident or mistake, and without any fraudulent or deceptive intention, the patentee, in said Letters Patent, has claimed more than that of which he was the original or first inventor or discoverer.

Your Petitioner therefore hereby enters its disclaimer to that part of the invention described in said patent which is set forth in the specification in the following words:

> "Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots."

except when that process is carried out by the preferred method of providing conducting projections or points be-

tween the meeting surfaces of the pieces to be united;

and its disclaimer to that part of the claim in the specification which is in the following words:

"1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

"2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

"3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and theheating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

"4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

"5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

"6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

"16. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

"17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

"18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union andthe portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

"19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

"20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points."

In Testimony Whereof your Petitioner has caused these presents to be signed by its President and its corporate seal to be affixed this 1st day of June, 1915.

Thomson Electric Welding Company

SEAL

By Benjamin F. Spinney
Secretary.
President.

The Universal Electric Welding Company hereby assents to the above disclaimer.

SEAL

Universal Electric Welding Co.

June 10, 1915.

By Chas H Hyde
Vice President

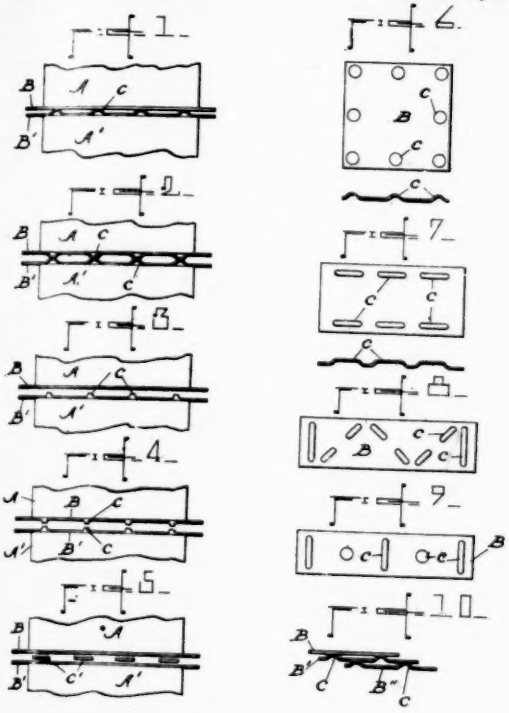
1827

A. F. RIETZEL.

UNITING THE COMPONENT PARTS OF COMPOSITE SHEET METAL STRUCTURES.

APPLICATION FILED FEB. 24, 1905.

928,701. Patented July 20, 1909.



WITNESSES:

Edward Cole

INVENTOR

Adolph F. Rietzel.

BY

Fennemore Decker

ATTORNEYS

1828

UNITED STATES PATENT OFFICE.

ADOLPH F. RIETZEL, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THOMSON ELECTRIC WELDING COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MAINE.

UNITING THE COMPONENT PARTS OF COMPOSITE SHEET-METAL STRUCTURES.

No. 928,701. Specification of Letters Patent. Patented July 20, 1909.

Application filed February 24, 1905. Serial No. 247,081.

To all whom it may concern:

Be it known that I, ADOLPH F. RIETZEL, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, (with post-office address Lynn, Massachusetts,) have invented certain new and useful Improvements in Uniting the Component Parts of Composite Sheet-Metal Structures, of which the following is a specification.

My invention relates to the manner of uniting or fastening two pieces of metal to one another and its object is more particularly to afford a substitute for the manner of uniting pieces of metal as heretofore practiced in the art of electric welding.

As applied to sheet metal manufactures the object is to afford a cheap and practical substitute for riveting and other methods of mechanically securing the two pieces of metal together. As applied to this branch of the metal working arts, the invention affords a means whereby articles of composite sheet metal manufacture may be made up by fastening the pieces of metal constituting the structure with a perfectly secure union and by a process that can be economically conducted.

Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots.

By the terms "weld" and "electric weld", as herein employed, I refer to that process of welding in which the metal is brought to plastic condition by passing an electric current from one to the other of two pieces where they are in contact and is welded while in such condition by the application of pressure, as contra-distinguished from a process of uniting metals, which is described in a patent to Bernardos, No. 363,320, dated May 17, 1887, and in which the union is effected by melting the metal by an arc and which is different from "welding" in the ordinary sense of the term as applied to metal manufactures, in that the metal is heated beyond the point of plasticity and pressure is not employed.

It has been before proposed to electrically weld two rods of metal together by a butt-welding process, the area of union effected being substantially coextensive with the cross-section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces. It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces. A weld formed according to my invention is distinguished however from such prior welds by the fact that the opposed surfaces are welded together in spots only, the heating electric current being localized or confined in any desired way to such spots so that the major portion of the opposed surfaces will not be involved in the welding, although they may, after the completion of the operation, lie in contact with one another or very close together.

My invention is particularly valuable in fastening of pieces of sheet metal together because not only does it limit the amount of electric energy required very considerably as compared with the prior methods of union, but it also diminishes the liability to burning of the metal which is liable to occur when the attempt is made to form a union of two sheets of metal by an electric welding process over substantially the whole area of the meeting or opposed surfaces.

In carrying out my invention any desired number of spots of union may be employed, such number depending obviously upon the extent of the meeting surfaces which are to be fastened together and also upon the strength of the union desired.

In carrying out my invention the localization of the flow of heating electric current and of welding pressure to the desired spot or spots may be brought about in any desired way. One of the preferred ways is by providing between the meeting surfaces or portions of the pieces to be united suitable conducting projections or points at the spots of union, which projections or points carrying the heating electric current from one piece to the other are so located in the meeting surfaces and are so separated from one another that on the application of the weld-

ing pressure the welded union resulting will be localized in the area of the opposed surfaces and will be substantially coextensive in area with the restricted area of the path of the effective heating current. Various ways of providing such points or projections will occur to those skilled in the art.

The preferred method is to indent the metal from the side reverse to that on which the union is effected by a suitable tool, the projections thus formed affording points for the passage of the electric current. This method is preferable also because it permits the welding to be produced at a multiplicity of spots simultaneously through the application of pressure over the whole rear surface of the plate, the points or projections in that case serving not only to localize the flow of the heating current but also to localize the welding pressure.

In the preferred manner of carrying out my invention in the case of sheet metal manufacture I provide projections from the meeting surfaces of both pieces that are to be united. Said projections may also be provided by interposing between the two plane sheets small pieces of conducting material which act in the same manner when the sheets are brought together, as projections which localize the heating current and the pressure. It will be understood, however, that in the latter instance as in the former, these pieces are so small and are placed such a distance apart that on the application of welding pressure there will be no running of the ...elds into one another but that the final union will be in spots only leaving well-defined areas on the meeting surfaces, in which the surfaces either lie in contact or separated from one another by a very thin space.

From the foregoing it will be seen that my invention is distinguished from prior methods of welding pieces of metal together in that it may be very cheaply practiced, because no attempt is made to weld over the whole of the opposed surfaces of the welded pieces; but on the contrary the union is at a spot or spots only which in ordinary cases will afford as strong a union as would be produced by the riveting of the pieces.

The invention further has the advantage that not nearly so much electric energy is required as is necessary when the electrically welded union extends over the whole area of the opposed surfaces. Moreover, the danger of burning when the attempt is made to weld two sheets of metal together by a lap weld is largely eliminated.

In the accompanying drawings Figures 1, 2, 3, 4 and 5 illustrate some of the ways in which the pieces of metal to be united may be prepared for the welding according to my invention. Figs. 6, 7, 8, and 9 show modifications in the form and disposition of the contact projections which result in the spots of electrically welded union. Fig. 10 shows the assembling of three plates together for welding according to my invention.

In the various figures of the drawing the invention is illustrated as carried out with two sheets of metal B. B'. In Fig. 1, plate B'. only is provided with the distinct or isolated spots (c) or projections for the flow of the electric current, to the plate B. which spots or points may be formed by indenting the plate with a suitable tool. The spots are located so far from one another that on the application of pressure coincidently with the flow of electric current from one plate to the other there will be a number of distinct areas or spots of electrically welded union of the plates separated by well-defined areas on the meeting surfaces in which no union takes place. The resultant is however a fastening of the plates together securely and which is practically as effective as if the attempt were made to form a welded union over the entire areas of the meeting surfaces. Obviously, the greater the distance between the spots the lesser the number that would be used and hence the lesser the consumption of energy in effecting the weld. This is of considerable importance where the meeting areas are large or where a considerable amount of work has to be done. The welding pressure is conveniently applied by conducting-blocks or electrodes, A, A', between which the two pieces B, B', are assembled. These electrodes, A, A', furnish the heating current while applying the pressure, the localization of the pressure in the spots being brought about in this instance by the pointing of the surfaces at point c.

In Fig. 2 both plates are provided with projections the points of which engage with one another, the pointing being produced by indenting the metal sheets from the rear.

Fig. 3 illustrates the localization of the welding by casting projections upon one of the sheets and Fig. 4 by casting projections on both pieces. The localization of the welding in spots might be effected as illustrated in Fig. 5 by interposing small pieces of metal at the spot or spots of desired union, these pieces operating when the plates are brought together in the same way as the projections before referred to. The number and size of the pieces and their distance apart is in this case, as before, so chosen that the application of pressure together with the flow of heating current from one plate to the other will result in a union of the two pieces over their opposed surfaces in spots only thereon.

Fig. 6 shows how the spots might be disposed to fasten the pieces together in distinct spots around their edges.

As shown in Figs. 7 and 8 the projections, instead of being round, might be somewhat elongated and irregularly or symmetrically arranged.

Fig. 9 shows round and somewhat elongated projections combined.

In all these instances however, the union over the surfaces of the plates is confined to spots or areas which are of comparatively small extent as compared with the total area of the meeting surfaces. As will be obvious, the form and disposition of the points or projections of initial contact for flow of the electric current and localization of the pressure may be greatly varied without departing from my invention.

Fig. 10 illustrates the welding of three plates of sheets together when superposed.

My invention is especially useful in the manufacture of articles from sheet metal which are stamped out to different forms, and which have heretofore had their component portions united by riveting or other purely mechanical expedient which is not only expensive but requires generally special tools and results in many cases in an insecure union. When the invention is employed in its preferred form or manner of practice in the field of sheet metal manufacture all that is necessary is to provide the contact spots or projections as already described and then to assemble the pieces in an electric welding machine and weld them together as already set forth.

The product of the foregoing process is readily distinguishable from that produced by melting down the metal of the pieces from the back at spots as proposed in the before mentioned patent of Bernardos in that there is no substantial alteration of condition of the metal back of the welds appearing as a burning, roughening or disintegration of the material by the very great heat of the electric arc employed for melting down the metal, and by the further fact that the unions themselves in the material of the juxtaposed or opposite faces have the characteristics of a true weld produced by bringing the metal to welding temperature only and applying pressure, so that the pieces are solidly and firmly united and cannot be readily torn apart as they could be if the metal at the spots has been melted down under the high temperature of the electric arc.

The product in the form of sheet metal is further particularly useful for sheet metal ware since the outer or exposed surface of the metal will have the smooth and practically unaltered finish of sheet metal and said surface will not be substantially marred when the process is properly conducted, excepting for the presence of such infrequent small depressions as might remain from the previous indentation of the metal from the back when, as hereinbefore described, an indenting of the metal may be resorted to.

The product in sheet metal also possesses the advantage that the spots of welding when located within the edges of the meeting surfaces will not show. The product is also superior to that produced by riveting of the plates in that there are no rivet heads to mar the finish of the back or outer surfaces of the metal.

What I claim as my invention is:

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

7. The method of welding two pieces of metal together, consisting in superposing said pieces with their surfaces at which the union is to take place superposed or pre-

sented to one another, pressing the pieces together, and passing a heating electric current from one to the other while localizing the heating current simultaneously in a number of distinct or separate spots of limited area, separated from one another sufficiently to secure a union of the pieces in a number of corresponding distinct spots surrounded by and separated from one another by distinct areas in which no union exists.

8. The method of uniting two pieces of metal, consisting in providing between their meeting surfaces a number of projections, spaced apart as described, pressing the pieces together and passing an electric current through said projections while confining the welding area of such current to said projections so as to leave distinct areas around spots in which no welding shall be produced.

9. The method of fastening two plates of metal together at a multiplicity of distinct or separate points of welded union, consisting in providing between them a number of isolated contact spots adapted to pass an electric current from one to the other but so separated that the electric welds will be separated from one another by unwelded areas, passing a heating electric current through such spots simultaneously and applying pressure as and for the purpose described.

10. The herein described method of electrically welding two plates or sheets of metal of any gage together by distinct spots of union disposed over their plane surfaces, consisting in providing a multiplicity of electrical contact spots coincident with the separated spots of union and disposed at such distances apart that there will be well-defined areas between spots through which the electric current will not flow, passing electric current from one plate to the other through said contact spots simultaneously and applying pressure as and for the purpose described.

11. The method of fastening two sheets of metal together, consisting in providing between them a number of isolated contact spots for the passage of the electric welding current, said spots being adapted to initially hold the plates apart and being separated from one another a sufficient distance to confine the welding to distinct areas or isolated spots, passing a heating electric current through a number of said contact spots simultaneously and pressing the plates together as and for the purpose described.

12. The method of fastening two plates of metal together, consisting in furnishing a surface of said plates with a number of projecting contact spots for the passage of welding electric current and disposed at such distances apart that on the application of pressure the welds will not run into one another, superposing said plates, passing a heating electric current from one to the other over said separated spots and applying the pressure to produce a spot-welding of the plates to one another as and for the purpose described.

13. The herein described method of fastening two pieces of metal together by providing each plate with a number of projecting contact spots on its plane surface disposed at such distances apart that the unions will not run into one another but will, nevertheless, firmly hold the plates together, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other through the spots and simultaneously applying pressure thus uniting the plates at a number of distinct points of welded union.

14. The method of uniting two sheets of metal face to face, consisting in indenting the material, superposing the plates with the points of the indentations engaged, passing an electric current from one plate to the other through said points simultaneously, and applying pressure while confining the area of heating to welding temperature to a circumscribed area or spot entirely surrounded by areas unheated to welding temperature to unite the pieces in a distinct spot or spots of small extent in the whole area of the opposed faces.

15. The herein described method of fastening two plates together at a multiplicity of distinct mechanically separated points of welded union, consisting in indenting each plate to form a number of projecting contact spots on the plane surfaces which are to abut, superposing said plates with the projecting spots in simultaneous engagement with one another, passing a heating electric current from one plate to the other thereby forming a number of distinct zones or points of heated metal, heated to welding temperature, and applying pressure to complete the union of plates by a number of mechanically distinct unions.

16. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

Signed at Lynn in the county of Essex and State of Mass. this 7th day of Feb. A. D. 1907.

ADOLPH F. RIETZEL.

Witnesses:
EDWIN W. HAWES.
E. I. FOSTER.

1833

DISCLAIMER.

928,701.—*Adolph F. Rietzel*, Lynn, Mass. UNITING THE COMPONENT PARTS OF COMPOSITE SHEET-METAL STRUCTURES. Patent dated July 20, 1909. Disclaimer filed June 12, 1915, by the assignee, *Thomson Electric Welding Company*.

Enters this disclaimer to that part of the invention described in said patent which is set forth in the specification in the following words:

"Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots"—except when that process is carried out by the preferred method of providing conducting projections or points between the meeting surfaces of the pieces to be united; and also enters its disclaimer to that part of the claim in the specification which is in the following words:

"1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

"2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

"3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

"4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

"5. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and, simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

"6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

"16. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

"17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

"18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

"19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

"20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points."—(*Official Gazette, June 22, 1915.*)

Disclaimer in Letters Patent No. 928,701.

1905

CONTENTS:

Print			
	Application		papers.
1.	Rejection	Apr. 12, 1905	
2.	Amendt A	Oct. 18, 1905	
3.	Rejection	Oct. 24, 1905.	
4.	Sub. Spec.	Oct. 23, 1906	
5.	Rej.	Nov. 9-1906	
6.	Amendt B	Nov. 19-1906.	
7.	Rej.	Dec. 5-1906.	
8.	Appeal Mem.	Nov. 30-1907	
9.	Letter	Dec. 9-1907	
10.	Amendt "C"	Dec. 18-1907.	
11.	Final Rej.	Jan. 27-1908.	
12.	Letter	Jan. 30-1908	
13.	Letter	May 28, 1908	
14.	Letter	June 8- 1908	
15.	"	" 16 "	
16.	Amd't."D" &	Affdts. Nov. 30, 1908	
17.	Letter	Dec. 2,	"
18.	Affidavit	Dec. 9, 1908	
19.	Rejection	" 14 "	
20.	Affidavit	Mar. 13, 1909.	
21.	Amdt. "E"	" " "	
22.	Letter (÷)	April 9, 1909	
23.	Amd't "F"	May 7,	"
24.	May 10, 1909	Letter	
25	" 28, "	Letter	
26	" 29, "	Letter	
27.	June 16, "	Amd't "G"	

✓ 28.	"	19	"	Letter
✓ 29.	"	23	"	Amd't "K"
30.				Intf. Card.
31.	APR 26 1910			Intf. Letter.
32	JUN 13 1911			" " .

TITLE:

Improvement in Uniting the Component Parts of Composite Sheet Metal Structures

20 Calims

1836

Defendant's Exhibit No. 35.

2—390.

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To All whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this Office of the File Wrapper and Contents, in the matter of

INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

Subject-Matter:—

ELECTRIC WELDING.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 14th day of September, in the (Seal) year of our Lord one thousand nine hundred and seventeen and of the Independence of the United States of America the one hundred and forty-second.

R. F. WHITEHEAD,
Acting Commissioner of Patents.

6—1625

Vol. 33
Page 222

1910

Vol. 57
Page 222

INTERFERENCE No. 31,792.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

Pat. No. 928,701.

Sr. No. 183,677.

ELECTRIC WELDING.

DIVISION 15.

2—251. Letter No. 227.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

April 14, 191 .

Examiner of Interferences:

An interference is found to exist between the following cases, and in respect to the invention therein specified, to wit:

CASES.

1. Name Adolph F. Rietzel.
   Post-office address Lynn, Massachusetts.
   Title Uniting the Component Parts of Composite Sheet Metal Structures.
   Filed Feb. 24, 1905. Ser. No. 247,081. Pat'd July 20, 1909. No. 928,701.
   Attorneys Townsend & Decker, of 141 Broadway, N. Y. City
   Assignee Thomson Electric Welding Co., of Lynn, Mass.
2. Name Johann Harmatta.
   Post-office address Szepesvaralja, Hungary.
   Title Electric Welding.
   Filed Dec. 3, 1903. Ser. No. 183,677.
   Attorneys O. E. Duffy & Son, of 612 F St., N. W., Washington, D C.

Intf. Number 31792
Intf. Declared Apr 26 1910
Statements Due 27 Jun 1910.
(For redeclaration see paper No. 48.)

6—2610

INVENTION.

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The method of uniting two sheet metal pieces together face to face, consisting in pressing them together, and simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by areas of no union.

3. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

4. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas.

5. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

6. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.

7. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described.

8. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points.

The relation of the counts of the interference to the claims of the respective parties is as follows:

Counts:	*Rietzel:*	*Harmatta:*
1	1	2
2	5	3
3	6	4
4	16	5
5	17	6
6	18	7
7	19	8
8	20	9

If the interference is decided against Harmatta all the claims now in the case will be rejected as not patentable over the issue.

(Counts compared.) A. P. SHAW, *Ex.*

Van Nest

Defendant's Exhibit No. 35.

Printed Letter Head Omitted.

Docket Clerk,
May 9, 1910.
U. S. Patent Office.
Mail Room,
May 9, 1910.
U. S. Patent Office.

31792—2

New York, May 7th, 1910.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In the matter of Interference No. 31,792, between patent No. 928,701, dated July 20th, 1909, of A. F. Rietzel and an application filed by Johann Harmatta for Electric Welding:

Kindly change our address as attorneys in the above case to 149 Broadway, to which address all communications should be forwarded.

Very respectfully,
TOWNSEND & DECKER.

CFT/IL

REGISTRY DELIVERY NOTICE.

Office Hours,
30 A. M.—7 P. M.

Lynn, Mass.,
May 26, 1910.
Registered.

..... Post Office.

M....Adolph Rietzel.....

Present this Notice at the Post Office or Station indicated by postmark, and receipt for a registered (Letter) No. ..... addressed to you.

POSTMASTER.

Postmaster: Dated, ..., 190

Please { *forward / deliver } the registered mail described above to

.....

.....

Addressee.

I verify addressee's signature above.

.....

2—224.—M.C.V. Paper No. 4.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 1, 1910.
Mailed " " "

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 31,792.

RIETZL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1652

The letter in which the notice of this interference was mailed to Adolph F. Rietzel, the patentee, addressed Lynn, Mass., has been returned by the Postoffice undelivered. The attorneys for Rietzel are requested to inform the Office on or before June 11, 1910, of the present address of Rietzel in order that the notice of interference may be forwarded to him as the rule requires.

H. E. STAUFFER,
Examiner of Interferences.

Printed Letter Head Omitted.

Mail Room. 31,792—5
June 4, 1910.
U. S. Patent Office.
Docket Clerk,
June 4, 1910.
U. S .Patent Office.

New York, June 3rd, 1910.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

Re Interference Rietzel vs. Harmatta No. 31,792:

Replying to the office letter dated June 1st, 1910, the present address of A. F. Rietzel, the patentee, is Charlestown, Rhode Island.

Notice of the receipt of the registered letter, as per enclosed slip, was received by Mr. Rietzel; but at the time he called at the post-office in Lynn the letter had been returned to the Patent Office.

Very respectfully,

TOWNSEND & DECKER.

CFT/IL
Enc.

Defendant's Exhibit No. 35.

2—224.—S.O.W. Paper No. 6.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

June 8, 1910.
Mailed " " "
Interference Division

BEFORE THE EXAMINER OF INTERFERENCES

IN RE INTERFERENCE NO. 31,792.

HARMATTA.

vs.

RIETZL

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1652

A letter is received from the attorneys for the patentee, Rietzel, stating that the present address of Rietzel is Charlestown, Rhode Island. Accordingly the notice of declaration of this interference for the party Rietzel which was heretofore returned by the Post-office is hereby re-sent to him by registered mail at the address hereinabove given.

H. E. STAUFFER,
Examiner of Interferences.

31,792—7

UNITED STATES PATENT OFFICE.

Statement of Rietzel.
Filed June 14, 1910.
Approved July 2, 1910.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792. W.

("W" in margin.)

PRELIMINARY STATEMENT OF ADOLPH F. RIETZL.

County of New London, State of Connecticut, ss:

ADOLPH F. RIETZEL of Charlestown, County of Washing-

ton and State of Rhode Island, being duly sworn, doth depose and say that he is a party to the interference declared by the Commissioner of Patents on the 26th day of April, 1910, between the patent of Adolph F. Rietzel, No. 928,701, dated July 20th, 1909, and an application for a similar invention filed by Johann Harmatta;

That he conceived the invention set forth in the declaration of interference during the latter part of October or first part of November, 1897;

That, as near as deponent can at this time fix the date, the invention was successfully reduced to practice in the latter part of July 1898, and at the same time was first explained and disclosed to others;

That sketches of the application of the invention were made in the early part of June 1904 and from time to time since that date innumerable sketches have been made of the invention as applied to various articles of manufacture;

That the invention has been put to very extensive use in the manufacture of numerous sheet and other metal work of various kinds.

ADOLPH F. RIETZEL.

Sworn to before me this 7 day of June, 1910.

ALBERT S. MARTIN,
Notary Public.

(Seal)

2—207. 31,792—8

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 14, 1910.

BEFORE THE EXAMINER OF INTERFERENCES.

In the matter of the Interference of

HARMATTA

vs.

RIETZEL.

INTERFERENCE No. 31,792.

Sir:

You are hereby informed that the preliminary statement of Rietzel has been received and filed.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

6—2051

Rietzel
c/o Townsend & Decker,
149 Broadway,
New York, N. Y.

Defendant's Exhibit No. 35.

31,792—9.

REGISTRY RETURN RECEIPT.

Received from the postmaster at.....
Registered { Letter / Parcel } No. 575493, from Post Office at WASHING, D. C.,
Addressed to .....
June 10, 1910 Mr. A. F. Rietzel.
.....
A. A. SAUNDERS.

Charlestown, R. I.,
June 10, P. M., 1910.

Post Office Department
Official Business.
Penalty for Private Use to Avoid Payment of Postage, $800.
Return to: Patent Office.
Name of Sender .....
Street and Number,)
or Post Office Box).....
Washington, D. C.

Docket Clerk.
June 20, 1910.
U. S. Patent Office.

31,792—10
Statement of Harmatta.
Filed June 20, 1910.
Approved July 2, 1910.
W.

("W" in margin.)

INTERFERENCE IN THE UNITED STATES PATENT OFFICE.

J. HARMATTA

vs.

A. F. RIETZEL.

No. 31,792.

PRELIMINARY STATEMENT OF JOHANN HARMATTA.

Johann Harmatta, Engineer, a subject of the King of Hungary, residing at Szepesvàralja, in the Kingdom of Hungary, being duly affirmed, deposes and says that he is a party to the interference declared by the Commissioner of Patents on April 26th, 1910, between his application for patent of the United States, filed December 3rd, 1903, serial number 183,677, for *"Improvements in Electric Welding"*, and the patent to Adolph F. Rietzel, of Lynn, Massachusetts, granted July 20th 1909, numbered 928,701, for

"Uniting the Component Parts of Composite Sheet-Metal Structures"; that he conceived the invention set forth in the declaration of interference at the end of the year 1900, without having had then the opportunity of carrying out said invention for lack of time; that on or about the 15th day of September 1901, as he set working his own manufactory at Szepesváralja, he first made drawings of the device for carrying out the process set forth in the claims involved in the interference; that in the first days of October 1901 he modified an old chain-welding machine so as to be able to carry out said process as set forth in the claims involved in the interference; that on the 15th of to the 20th day of October 1901, he had thin iron sheets welded and attachments welded upon sheet metal vessels successfully and on a manufacturing scale by his workmen Michael Hozza and Michael Tomaskiewicz, with the help of the process forming the object of the claims involved in the interference; said two workmen, which live here at Szepesváralja and which remember very well to have performed the said work at the mentioned time, being ready to give testimony in respect of the above facts; that in the course of November 1901 he mentioned said electric weldings of thin iron sheets to Mr. Hegenscheidt, Director General of the firm "Oberschlesische Eisenindustrie A. G." (Upper Silesian Iron Industry Company of share-holders) at Gleiwitz, Silesia, Germany, in the presence of the Chief-Engineer of said Mr. Hegenscheidt, Mr. Wilhelm Fischer, which is at present Director, and that said gentleman promised to inform the firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz, Silesia, Germany, about the said electric weldings of thin iron sheets; that the firm "Eisenhütte Silesia" received said information from said gentlemen, but raised doubts about the possibility of electrically welding such thin iron sheets without danger of burning through said metal sheets; that said firm "Eisenhütte Silesia", for the sake of verification, sent during the summer of the year 1902, to him (Harmatta) several blanks of sheet metal utensils, which he (Harmatta) welded, with the help of the process forming the object of the claims involved in the interference, to the thorough satisfaction of said "Eisenhütte Silesia", that then Mr. Schweisfurth of Paruschowitz, technical Director of the firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz, Silesia, Germany, came to him in order to look at the electric weldings and the modified chain-welding machine; and, as said Mr. Schweisfurth had convinced himself by ocular proof that it is very easy to weld such thin iron sheets with the help of the process forming the object of the claims involved in the interference, the said firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschwitz acquired the property of said process by a contract made with him (Harmatta) at the date of February 12th, 1902, and that from the month of January 1903 a great number of full-size machines adapted to carry out the welding process forming the object of the claims involved in the interference have been manufactured by said "Eisenhütte Silesia" for personal use and sale to others; the first new and full-

size machine of this kind having been completed in the last days of January 1903 and first successfully operated and used in February 1903 for carrying ou. his process, in the works of the "Eisenhütte Silesia", in the village of Paruschowitz, Silesia, (Germany).

That patents for such invention were applied for and obtained as follows:

Application filed in Germany, March 24th, 1903, published June 20th, 1904, patent not granted;

application filed in Sweden, October 12th, 1903, patent dated October 12th, 1903, No. 24035; published the 16th day of November 1907 and granted the 23rd day of January 1908;

application filed in France, October 13th, 1903, patent dated October 13th, 1903, No. 336187; published the 1st Day of March 1904 and granted the 7th day of January 1904;

application filed in Austria, October 14th, 1903, patent dated August 1st, 1905, No. 24335; published the 8th day of January 1905 and granted the 30th day of March 1906;

application filed in Denmark, October 14th, 1903; published May 16th, 1905, patent not granted;

application filed in Luxemburg, October 14th, 1903, patent dated October 15th, 1903, No. 5300; published the 14th day of October 1903 and granted the 14th day of October 1903;

application filed in Hungary, October 15th, 1903, patent dated October 15th, 1903, No. 31382; published the 29th day of April 1904 and granted the 24th day of August 1904;

application filed in Switzerland, October 15th, 1903, patent dated October 15th, 1903, No. 29723; published June 21st, 1905 and granted the 21st day of June 1905;

application filed in Belgium, October 16th, 1903, patent dated October 16th 1903, No. 173119; published the 20th day of January 1904 and granted the 31st day of October 1903;

application filed in Russia, October 20th, 1903, patent not granted;

application filed in Spain, October 20th, 1903, patent dated December 10th, 1903, No. 32726; published the 10th day of December 1903 and granted the 10th day of December 1903;

application filed in Italy, October 22nd, 1903, patent dated October 22nd, 1903, No. 180/117; published the 16th day of December 1903 and granted the 16th day of December 1903;

application filed in Great Britain, October 23rd, 1903, patent dated October 23rd, 1903, No. 22981/1903; published the 20th day of October 1904 and granted the 25th day of August 1904;

application filed in Canada, December 4th, 1903, patent not granted;

application filed in Canada, December 4th, 1903, patent not granted;

application filed in Japan, December 14th, 1903, patent dated April 6th, 1905, No. 8640; published the 6th day of April 1905 and granted the 6th day of April 1905;

application filed in Romania, July 11th, 1906, patent not granted.

That such invention was fully described in the following patent specifications; Sweden No. 24035; France No. 336187; Austria No. 24335; Hungary No. 31382; Switzerland No. 29723; Great Britain No. 22981/1903; Japan No. 8640.

The knowledge of such invention was first introduced in the United States on December 3rd, 1903 by the papers belonging to said U. S. application of Harmatta, serial number 183,677, for "Improvement in Electric Welding", filed December 3rd, 1903, said application papers having been sent by applicant to Messrs. Marion & Marion at Montreal, Canada, who filed said application to the United States Patent Office on December 3rd, 1903.

JOHANN HARMATTA.

American Consulate General, Budapest, Hungary, ss:

N. S. 272/1910.

Subscribed and affirmed to before me this 8th day of June, 1910.

(Seal) F. E. MALLEN,

Foreign Fee Stamp *Vice and Deputy Consul General.*
M/C.

Paper No. 11, not in File.

S. O. W 2—215. Paper No. 12.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

July 2, 1910.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

Defendant's Exhibit No. 35.

The parties to the above-entitled interference are hereby notified that their preliminary statements are approved, and that testimony must be taken, forwarded, and printed in accordance with the published Rules of Practice of the office.

The dates of filing and the serial numbers of the applications are given, and the times for taking testimony and for final hearing are set as follows:

No testimony to be taken within thirty days from date hereof.

Adolph F. Rietzel filed February 24, 1905, No. 247,081; patented July 20, 1909, patent No. 928,701.

Testimony in chief to close October 3, 1910.

Johann Harmatta filed December 3, 1903, No. 183,677.

Testimony to close November 3, 1910.

Rietzel's rebuttal testimony to close November 18, 1910.

Final hearing January 18, 1911, at 11 a. m.

H. E. STAUFFER,
Examiner of Interferences.

31792—13.

Printed Letter Head Omitted.

Docket Clerk.
July 6, 1910.
U. S. Patent Office.

Attorneys' Room.
July 6, 1910,
U. S. Patent Office.

New York, July 5th, 1910.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In the matter of the Interference Rietzel vs. Harmatta, No. 31,792:

Please permit Joseph R. Edson of Washington, D. C., to inspect the file wrapper and contents of the Harmatta application Serial No. 183,677, involved in the above interference and make copies thereof. Also permit the said Joseph R. Edson to inspect the preliminary statement filed by Harmatta and make copies.

Very respectfully,

TOWNSEND & DECKER,
Attys. for Rietzel.

CFT/IL

Authority to Make Copies.

Docket Clerk.
July 6, 1910.
U. S. Patent Office.

Attorneys' Room.
July 6, 1910,
U. S. Patent Office.

July 6, 1910.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

Please permit Misses A. M. and E. H. PARKINS, Washington

Loan & Trust Building, Washington, D. C., to examine and make copies in Interference of Rietzel vs. Harmatta #31,792.

Improvement in
Filed Serial No.
and oblige,

Respectfully,
JOSEPH R. EDSON,
H.
Attorney.

Docket Clerk.
Sept. 9, 1910.
U. S. Patent Office.

31792—14.

Mail Room.
Sept. 9, 1910.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

New York, September 6, 1910.

Messrs. O. E. Duffy & Son,
612 F Street, N. W.,
Washington, D. C.

SIRS:—

PLEASE TAKE NOTICE that on Wednesday, September 14, 1910 at 10 o'clock A.M. or as soon thereafter as counsel may be heard before the Examiner of Interferences, we shall move to transmit the accompanying motion for dissolution of this Interference to the proper primary Examiner for his determination and shall also move for a stay of proceedings pending the final determination of said motion.

In support of the motion to transmit we shall refer to the annexed affidavit of Chas. F. Tischner, Jr.

TOWNSEND & DECKER,
Attorneys for Rietzel.

Defendant's Exhibit No. 35.

AFFIDAVIT OF SERVICE.

State of New York, County of New York, ss:

FREDERICK S. BORDEN, being duly sworn, deposes and says; that he is a Clerk in the office of Messrs. Townsend & Decker, 149 Broadway, New York; that on Wednesday, September 7, 1910, he deposited with the Post-Office authorities at New York City, N.Y. and caused to be sent prepaid by registered mail, a sealed envelope addressed to Messrs. O. E. Duffy & Son, 612 F. Street, N.W. Washington, D. C., as per attached registry slip, which envelope contained a copy of the accompanying motion papers.

FREDERICK S. BORDEN.

Subscribed and sworn to before me this 8th day of Sep., 1910.

WALTER C. KANE,
Notary Public, New York County.

(Seal)

Postmaster, per.....

Letter)
Parcel) No. 23451 P. O., Hudson Terminal Station, New York, N.Y.

Received for registration....., 190 , from.....
Townsend &Decker
addressed to O. E. Duffy & Sons
Wash D. C.
.....class postage prepaid Postmaster per.....

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

MOTION FOR TRANSMISSION.

Now comes Adolph F. Rietzel, by his duly authorized attorneys, and moves that the Honorable Examiner of Interferences transmit the accompanying motion for dissolution of this Interference to the proper primary Examiner for his determination and in support thereof beg to refer to the accompanying affidavit of Chas. F. Tischner, Jr.

It is also moved that a stay of proceedings be granted pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys.

New York, N. Y., Sept. 6, 1910.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

AFFIDAVIT.

CHAS. F. TISCHNER, Jr., being duly sworn, deposes and says, that he is a member of the firm of Townsend & Decker, 149 Broadway, N.Y., the attorneys of record for the party Rietzel in the above Interference; that on the 5th day of July, 1910, said firm received a communication by mail from the Examiner of Interferences dated July 2, 1910, the date of mailing and which was a Saturday, stating that the preliminary statements of the parties in the above Interference were approved and setting times for taking testimony; that on that day, namely July 5th, the said firm ordered from the Commissioner of Patents a certified copy of the file wrapper, contents and drawings of the application of Harmatta involved in the above Interference; that said certified copy was not received by said firm until the 3rd day of August, 1910; that immediately upon receipt of said copy deponent examined into it and found that it was not complete in that prints of two sheets of drawings filed in the case and subsequently cancelled were not included in the copy; that therefore on that day, namely August 3rd, said firm returned the copy to the Commissioner of Patents together with a letter calling attention to the incompleteness of the copy and requesting that the two additional prints be added; that said corrected certified copy was not received to the best of deponent's knowledge and belief by the said firm until late in the day on the 11th day of August, it having been mailed by the Patent Office on the 10th day of August; that at that time deponent, who has had this case in charge, was engrossed in a number of important cases demanding immediate attention and which could not be postponed; that said cases necessitated deponent making two sepa-

rate out of town trips; that at the earliest moment thereafter deponent took up the thorough examination of the Harmatta file wrapper; that the said file wrapper is somewhat lengthy and consumed considerable time in thoroughly digesting it; that the file wrapper appears to be much confused and considerable time was consumed in trying to reconcile the line numbers of the various substitute specifications with the line numbers designated in various amendments as lines to be amended; that besides other numerous amendments three complete substitute specifications and claims were filed which necessarily consumed considerable time in consideration; that the substance of the present motion was practically decided upon the latter part of the month of August, but owing to the intervening holidays and the great press of business in deponent's office taking testimony it was not possible to get the motion papers in proper shape for service until the present time; that no testimony has been taken in the above interference; that no other motions to deponent's best knowledge and belief have been brought in this interference and that the motion is made in good faith and not for purposes of delay.

CHAS. F. TISCHNER, JR.

Sworn to and subscribed before me this 7th day of September, 1910.

(Seal)

WALTER C. KANE,
Notary Public, New York County.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE PRIMARY EXAMINER.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

MOTION TO DISSOLVE.

Now comes ADOLPH F. RIETZEL, a party to the above entitled Interference, by his attorneys and moves that the Interference be dissolved on the following grounds:

FIRST, that the party Harmatta has no right to make the claims forming the subject of the Interference for the reason that he disclaimed the subject-matter of the counts of the Interference in his substitute specification filed May 14, 1904, beginning with the

paragraph "As Fig. 1 shows" on page 2 and again repeated the disclaimer by his amendment to said specification filed May 18, 1906, and he did not withdraw said disclaimer by merely complying with the Examiner's requirement when he insisted on said requirement that "the description should be confined to applicant's process of welding and not to a discussion of prior processes and their disadvantages."

SECOND, that the party Harmatta has no right to make the claims forming the subject of the Interference for the reason that there is no patentable different between carrying out any process of welding by applying pressure before and during the period of supplying the electric current and by applying pressure only at the moment of the electric current supply as stated at lines 4-10 on page 1 of Harmatta's original specification and the applicant Harmatta by his amendments eliminating the method consisting in applying pressure only at the moment of current supply has disclaimed that method as his invention and therefore has no right to make any claim founded upon the use of pressure and current.

THIRD, that the party Harmatta has no right to make the claims forming the subject of counts 4, 5, 6, 7 and 8 of the issue of this Interference for the reason that he has not filed the oath required by Rule 48 and the Patent Statutes.

TOWNSEND & DECKER,
Attorneys.

New York, N. Y., Sept. 6th, 1910.

Docket Clerk.
Sept. 14, 1910.
U. S. Patent Office.

31792—15.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

NOW COMES Johann Harmatta by his attorneys, and in answer to the motions to transmit and the motion to dissolve the above entitled interference brought by the party Rietzel, states, that the passage referred to as a disclaimer is in no sense a disclaimer of the subject matter of the claims in interference, but as will be seen said passage is simply a statement of the effect of the process of welding

thick or heavy sheets where no pressure is applied to the sheets at the welding point during the welding process. To clearly show that such statement is not a disclaimer attention is directed to last paragraph, page 3 et seq., of the amended specification filed May 14th 1904.

The claims 4, 5, 6, 7 and 8 which it is contended cannot be made by the party Harmatta unless accompanied by a supplemental oath are restricted or limited claims and the subject matter thereof embraces a natural consequential condition which must necessarily obtain when the weld is effected as recited in claim 1.

It would be impossible to weld metal sheets by point or spot welding intermittently or at spots only, as for instance as described in the brief description of original Fig. 1 commencing on last line of page 2 of the original specification unless the resulting welded plates had meeting surfaces separated from one another by distinct unwelded areas, and the welded spots "surrounded by distinct areas of unwelded union." These claims therefore simply recite a structure necessarily resulting from a welding as recited in claim 1, and therefore are not such claims as would fall under Rule 48, and therefore it clearly follows that applicant is entitled to make these claims.

In reply to the contention that the party Harmatta has disclaimed the method by eliminating from his specification the method consisting in applying pressure only at the moment of current supply and therefore has no right to make any claim founded upon the use of pressure and current, is not well taken as this is the gist of Harmatta's invention. When an applicant recites two or more alternatives, all of which are mechanical equivalents, he may cancel one or more of the alternatives from the specification and retain one if he chose without in any way disclaiming the other alternatives, providing of course that they are mechanical equivalents. This was clearly held in the case of Hunt Brothers Fruit Packing Company vs. Cassidy, U. S. Circuit Court of appeals, 62 O. G. 1965. In this case it was held that:

> "In Letters Patent #172,608, issued Jan. 25th 1876 to John W. Cassidy for an Improvement in Fruit Driers, the patentee first claimed 'spring or other catches,' but on an objection that his application was not in proper form, amended by striking out 'or other.' Held that this was not a disclaimer of gravity catches, which were known mechanical equivalents of spring catches."

This decision is in accordance with the practice of the Office and does not seem to be open to attack, and applicant in the specification may or may not set forth a number of alternative mechanical equivalents, but should he set forth two or more alternatives which are mechanical equivalents he may cancel one or all of the alternatives and retain one providing they are mechanical equivalents, and

such cancellation from a specification is not a disclaimer of the matter cancelled or of the alternatives cancelled as was clearly held in the above cited case of the Hunt Brothers Fruit Packing Company vs. Cassidy.

It is therefore respectfully submitted that the grounds for transmitting and dissolving the interference are not well taken and that the motions should be dismissed.

Respectfully,

JOHANN HARMATTA,
By O. E. DUFFY & SONS,
Attorneys.

LBF 2—224. Paper No. 16.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

September 17, 1910.
Mailed " " "
Interference Division.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
6—1652 *Commissioner of Patents.*

This is a motion by Reitzel to transmit to the Primary Examiner a motion to dissolve.

The motion to transmit is opposed, but the opposition relates rather to the merit of the motion than to its transmission.

The motion to dissolve comes after the time allowed by the rules therefor, but the excuse for the delay is clearly sufficient.

The motion to dissolve alleges; (1) that Harmatta has no right to make the claims of the issue become of an alleged disclaimer in

his specification; (2) that Harmatta has no right to make the claims of the issue for certain other reasons specifically set forth; and (3) that said party has no right to make the claims because of the absence of the supplemental oath required by Rule 48.

It is believed that the questions raised under Sections (1) and (2) are such as should be passed upon by the Primary Examiner. The question raised under heading (3) however forms no proper basis for dissolving the interference. It has been repeatedly held that the question of the sufficiency of the oath, either the original oath or a supplemental oath, is an *ex* parte matter which may be readily adjusted after the interference shall have been determined. The motion, therefore, can not be transmitted as to this ground.

The motion to transmit is granted as to grounds (1) and (2). The motion to transmit is denied as to ground (3).

Limit of appeal: September 27, 1910.

The taking of testimony is suspended.

H. E. STAUFFER,
Examiner of Interferences.

Mail Room.
Sept. 23, 1910.
U. S. Patent Office.

Intf. No. 31,792. Paper No. 17.

Docket Clerk.
Sept. 23, 1910.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

INTERFERENCE No. 31,792.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

APPEAL TO THE COMMISSIONER.

The party Rietzel to the above interference hereby appeals to the Commissioner of Patents in person from that part of the decision of the Examiner of Interferences rendered September 17th, 1910, refusing to transmit to the Primary Examiner the third ground of the motion to dissolve brought by Rietzel.

The following are assigned as the reasons of appeal:

It was error to refuse to transmit the third ground of the motion to dissolve for the following reasons:

(a) That the question raised is not as to the sufficiency of an oath on file.

(b) That the question as to whether the party Harmatta to the above entitled interference can or cannot make the oath required by the Rules and the Statutes should be settled before the interference is proceeded with.

(c) That the question whether the party Harmatta can or cannot make the oath should be settled before the interference is determined for the reason that if the party Harmatta cannot make the oath required there will be no need to proceed with the contest in reference to the claims involved in the said third ground of the motion to dissolve.

(d) That the question raised by said ground goes to the basic right of the party Harmatta to make the claims involved in some of the counts of the interference and as such should be decided by the Primary Examiner.

ADOLPH F. RIETZEL,
By TOWNSEND & DECKER,
Attorneys.

New York, N. Y., September 22nd, 1910.

Copy. 2—201. 31,792. Paper No. 18.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

Sept. 23rd, 1910.

Sir:

The case of

RIETZEL

vs.

HARMATTA,

INTF. No. 31,792,

APPEAL ON MOTION,

will be heard by the Commissioner on the 27th day of October, 1910.

The hearings will commence at ten o'clock, and as soon as the argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;
Motions, thirty minutes, each side;
Interference appeals, final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in interference cases, and in such case a full and fair opening must be made.

Briefs in interference appeals must be filed in accordance with the provisions of Rule 147.

Respectfully,

E. B. MOORE,
Commissioner of Patents.

To all parties. 6—1961.

Docket Clerk.
Oct. 26, 1910. Intf. No. 31,792. Paper No. 19.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE COMMISSIONER OF PATENTS.

In re Interference:

RIETZEL, I.

vs.

HARMATTA.

No. 31,792.

STIPULATION.

It is hereby stipulated and agreed by and between counsel for the respective parties, the Commissioner of Patents consenting, that the hearing on the appeal by Rietzel now set for October 27, 1910 be postponed two weeks from the date now set.

TOWNSEND & DECKER,
C. F. TISCHNER, JR.,
Attorneys for Rietzel.

O. E. DUFFY & SONS,
Attorneys for Harmatta.

New York, N. Y., Oct. 25, 1910.

O 2—201. Intf. No. 31,792. Paper No. 20.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

October 26, 1910.

Sir:

The case of

RIETZEL L.

vs.

HARMATTA,

INTF. NO. 31,792,

APPEAL ON MOTION,

will be heard by the Commissioner on the 23d day of November, 1910.

The hearings will commence at ten o'clock, and as soon as the argument in one case is concluded the suceeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;

Motions, thirty minutes, each side;

Interference appeals, final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in interference cases, and in such case a full and fair opening must be made.

Briefs in interference appeals must be filed in accordance with the provisions of Rule 147.

Respectfully,

E. B. MOORE,
Commissioner of Patents.

To all parties. 6—1961.

#21.

Printed Letter Head Omitted.

Docket Clerk.
Oct. 26, 1910.
U. S. Patent Office.

Mail Room.
Oct. 26, 1910.
U. S. Patent Office.

New York, Oct. 25, 1910.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:—

In the matter of the interference

RIETZEL,

vs.

HARMATTA.

No. 31,792.

Please enter our appearance as attorneys in the above case.

Respectfully,
TOWNSEND & DECKER,
H. C. TOWNSEND,
C. F. TISCHNER, JR.

Docket clerk.
Nov. 23, 1910.
U. S. Patent Office. Intf. No. 31,792. Paper No. 22.

UNITED STATES PATENT OFFICE.

ADOLPH F. RIETZEL,

vs.

JOHANN HARMATTA.

INTERFERENCE No. 31,792.

BEFORE THE COMMISSIONER OF PATENTS ON APPEAL FROM THE DECISION OF THE EXAMINER OF INTERFERENCES.

BRIEF FOR RIETZEL.

This case comes up on appeal by the party Reitzel from that part of the decision of the Examiner of Interferences dated September

17th, 1910, refusing to transmit to the Primary Examiner the third ground of the motion to dissolve brought by Rietzel.

The part of the original motion to dissolve referred to is as follows:

"Third. That the party Harmatta has no right to make the claims forming the subject of counts 4, 5, 6, 7 and 8 of the issue of this interference for the reason that he has not filed the oath required by Rule 48 and the Patent Statutes."

The Examiner holds that the question raised under this head forms no proper basis for dissolving the interference for the reason that "it has been repeatedly held that the question of the sufficiency of the oath, either the original oath or a supplemental oath, is an ex parte matter which may be readily adjusted after the interference shall have been determined."

The question raised by Rietzel in this section of the motion is not as to the sufficiency of an oath on file nor to whether the subject-matter of the counts in question is broader than the claims originally filed but goes to the basic right of the party Harmatta to make any such claims as are involved in the counts of the interference in question, which counts are for a subject-matter not claimed originally nor claimed by Harmatta at all until inserted for interference purposes. Harmatta has not filed any oath whatever with respect to the subject-matter of the counts above referred to, the counts being drawn to metal articles, sheets or plates secured together in a certain manner, and the question is therefore not as to the sufficiency of an oath on file but rather as to whether Harmatta can in reality make a proper oath as being the inventor of such articles. And to delay the determination of this question until after the determination of the question of priority in the interference amounts to stating that the Patent Office will try a moot case, which proceeding it has been repeatedly held in the Patent Office will not be followed.

The party Reitzel is a patentee, to whom the claims forming the subject-matter of this interference were granted, and the party Harmatta, a subject of the King of Hungary, is an applicant, who, although his case was on file at the time Rietzel's application was pending, never made any claims to an article of any nature whatsoever until after Rietzel's patent issued when, at the suggestion of the Primary Examiner, he copied the claims from Rietzel's patent and entered into contest as to the counts above referred to. Thus, although his application had been on file for over six years, he had never contended that the article now claimed was in any way his invention and when he found claims were granted to another on subject-matter he never contended was his invention he merely copied the claims and inserted them in his application without complying with the requirements of the Statutes as to the filing of an oath and there is nothing to determine whether he could legitimately make such oath and without first determining such question it cannot be conceived how the Patent Office can sanction any

proceeding allowing him to enter into the contest until it is determined whether he can make a proper oath.

The Statute requires the inventor to make oath that he is the original and *first* inventor. There is grave doubt, as will appear from an inspection of Harmatta's file wrapper, whether he can make such a statement under oath. To delay the determination of this question until after the question of priority has been fought out would be to subject the party Rietzel, against whose patent time is running, to great expense, and why the party Rietzel should be compelled to undergo this hardship until it has been determined whether or not Harmatta has any right whatever to contest priority of these claims cannot be conceived.

The Patent Office is assuming, in withholding the requirement of proper oath before proceeding with the interference, that Harmatta could make such proper oath and therefore the contest as to priority should proceed, but there is nothing in the record to indicate that such a state of facts exists but rather it is evident that the reverse condition is present. That the Patent Office takes the view that in general an interference will not be dissolved or suspended where a supplemental or proper oath has not been filed and sets down this doctrine against all cases irrespective of the merits or points of distinction or differences raised and in fact without even considering them and holds to the hard and fast rule without consideration of the merits or the hardships which might be worked thereby or the injustice which might result, certainly seems, to say the least, to be at variance with the orderly practice that all questions respecting the merits should be definitely decided before proceeding with the contest of priority.

Suppose the interference was proceeded with and it was eventually found that Harmatta could not rightfully make all allegations required in the oath, how would the Patent Office justify itself for not having considered this point before allowing Harmatta to contest these claims?

The subject matter of the claims which were originally sworn to by Harmatta as indicating what was properly his invention was a specific method of electric welding limited in scope and a specific apparatus and not metal plates joined at spots in a certain way by *any* electric welding method adapted for the purpose as called for in the claims forming the subject-matter of counts 4, 5, 6, 7 and 8 of this interference.

Although Harmatta describes the result attained by the practice of one form of his invention as being a joining of plates at spots to take the place of rivets, he did not claim this broad result but only claimed a specific method and a particular form of apparatus for carrying out the method as his invention, by the practice or use of which articles according to the above claims in a restricted sense might be obtained, but which could also be attained by other methods not the invention of Harmatta, thus leading to the inference that he did not make this invention broadly and could not

claim it as being his invention but rather he invented a specific method, claimed to be new, for making certain kinds of articles. This view is strengthened by his specific claims to his preferred form of apparatus, in which he claims "rollers," which rollers make a continuous seam weld. This view is still further strengthened by his statement in his substitute specification filed May 14, 1904, as amended May 18, 1906, to wit: "In known processes the electrodes lie opposite each other, the sheets to be welded by the ordinary process being located between them." Any such process as he herein describes as being old in his knowledge, and therefore disclaims, would result in the metal articles specified in the counts 4, 5, 6, 7 and 8 and therefore he admits he cannot make such claims, the subject-matter being, to his knowledge, old. What knowledge he may have had in mind as a basis for this statement is immaterial to the question in issue. Having made this admission that he cannot claim such articles as his invention, he then seeks to entirely wipe out such admission by merely filing unsupported claims without making oath to the various allegations required by the Statutes before he can even be assumed to be regarded as entitled to make them.

The claims in question are so far at variance with the claims originally sworn to that Harmatta should not be permitted to retain them in the Patent Office for the purposes of interference or for other purposes until it is seen whether he can make a proper oath.

The original specification only sets forth that Harmatta claims to be the inventor of a process and an apparatus and his oath was only made on that specification. Under this oath, Harmatta did not claim any article welded together at a spot or spots but merely claimed a *specific* process. Harmatta may in a brief statement, describe the subject of the claims in a narrow or restricted degree but he has never sworn to a proper oath or an oath of any kind with respect to such claims. The subject of such claims might have been disclosed in some patent or application of his filed more than twelve months before filing his application here or Harmatta might have known he was not the first inventor of *articles* according to said claims or he might have been or is aware that such *articles* were known before his invention or he might not have been at that time or now able to make other allegations required by the Statutes so that he cannot make the necessary oath without perjuring himself, he claiming at that time but a specific process and specific apparatus as his invention and not an article which is not limited to being made by such fanciful process and which might be attained by apparatus other than the specific apparatus claimed by him as his invention.

An examination of the authorities which hold that a motion to dissolve should not be transmitted when based on the requirement of a supplemental oath or the sufficiency of an oath reveal that the question was in those cases occasioned merely by an applicant broadening his claims for interference purposes or where the

question as to the sufficiency of the oath was raised. It is submitted that in this case an entirely different question is in issue—here, the applicant filed claims entirely different as to subject-matter from those originally sworn to and no oath whatever for such subject-matter has ever been made by the applicant.

To go back to the original case holding that a motion of a slightly similar nature to that under discussion should not be transmitted, namely, Rennyson vs. Merritt, 58 O. G. 1415, it was held:

"The question of whether a supplemental oath shall or shall not be requirerd is ex parte in its nature and not open to argument on the part of an opposing interference contestant."

In this case the question arose by one applicant filing broader claims than those originally sworn to but of the same nature. The case is entirely different from the one presented in this interference and to hold that the case just cited is a pertinent authority for following its holding in the present case amounts to saying that insofar as the party Rietzel is concerned it does not matter whether Harmatta can properly make the claims or not; Rietzel cannot argue the question and he must contest priority even though in the end it is found that Harmatta was not properly entitled to make the claims.

This quesion as to whether Harmatta can make proper allegations under oath is a mighty vital point to the interference owing that he has never established his right to them as required by Statute and it is in this point that the present case differs from all previously decided cases. If Rietzel is not interested in this point and cannot be heard in argument as to why Harmatta should be compelled in this case to file a proper oath it cannot be seen what rights he has got in the interference.

If Harmatta cannot make the necessary oath why should he have the right to contest priority and he should not be allowed to contest priority until it is seen whether he can make the oath and properly assert his rights to the claims in conformity with the requirements of the Statutes.

If the interference is not dissolved with respect to the counts referred to on account of the lack of this oath it should, in justice, be suspended pending the filing or non-filing of such an oath and the party Rietzel should certainly be allowed to argue the merits of his contention regarding the necessity of settling the question of Harmatta's rights in this interference before the proper tribunal, the Primary Examiner, following all requirements of orderly procedure, and to hold, that merely because in previous cases a somewhat similar motion was not transmitted and was lacking in merit, that Rietzel's motion is lacking in merit without even considering the merits that can be advanced in its favor is entirely contrary to a proper and lawful recognition of Rietzel's rights in this interference.

In conclusion, we would say that rather than adhere to the broad proposition, that in no case will a motion to dissolve be transmitted

which is based on the lack of or the sufficiency of an atth irrespective of the merits or the points which demand the filing of such proper oath as vitally affecting the right on one party to enter into the interference, the exigencies of the particular case at issue should be carefully weighed and passed upon. As the practice stands now on this point, a broad rule is followed hard and fast and the justice or injustice will not be considered. It is respectfully submitted that in this case there are ample and sufficient reasons, as set forth above, for departing from such hard and fast holding and for transmitting the part of the motion to dissolve in question to the Primary Examiner for decision and it is respectfully requested that the Commissioner transmit such question for thorough consideration and careful determination by the Primary Examiner.

Respectfully submitted,
TOWNSEND & DECKER,
C. F. TISCHNER, JR.,
Attorneys for Rietzel.

Dated New York, N. Y.
November 22, 1910.

November 23, 1910.
Recorded vol 99.
Page 346.

Intf. No. 31,792, Paper No. 25.
SET

IN THE UNITED STATES PATENT OFFICE.

RIETZEL

vs.

HARMATTA.

PATENT INTERFERENCE No. 31,792.

APPEAL ON MOTION.

ELECTRIC WELDING.

Patent granted Adolph Rietzel July 20, 1909, No. 928,701, on Application filed February 24, 1905.
Application of Johann Harmatta filed December 3, 1903, No. 183,677.

Messrs. Townsend & Decker for Rietzel.
Messrs. O. E. Duffy & Son for Harmatta.

This is an appeal by Rietzel from that portion of the decision of the examiner of interferences refusing to transmit to the pri-

mary examiner the third ground of his motion to dissolve the interference.

This ground reads as follows:

> "Third, that the party Harmatta has no right to make the claims forming the subject of counts 4, 5, 6, 7 and 8 of the issue of this interference for the reason that he has not filed the oath required by Rule 48 and the Patent Statutes."

Transmission of this part of the motion to dissolve was denied by the examiner of interferences upon the ground that the sufficiency of the oath is an *ex parte* matter which may be readily adjusted after the interference shall have been determined.

The record shows that the application of Harmatta as filed disclosed a method, an apparatus, and an article, but contained only claims to the method and apparatus. The examiner suggested to him, under the provisions of Rule 96, both method and article claims from the patent to appellant, which had in the meantime inadvertently issued upon a subsequently filed application. The amendment of Harmatta insèrting his claims was not accompanied by a supplemental oath.

It is well settled that the question of whether claims inserted by amendment should be supported by a supplemental oath is an *ex parte* matter not open for argument in the interference proceeding, and that in the absence of such an oath, even where it should have been furnished, there is no such irregularity as will preclude the proper determination of the interference. Rennyson v. Merritt, 58 O. G., 1415; Kane v. Brill and Adams, 84 O. G., 1142; *ex parte* Richards, 95 O. G., 1853; Silverman v. Hendrickson, 99 O. G., 445; Auerbach v. Gubing v. Wiswell, 108 O. G., 289; Schubert v. Munro, 113 O. G., 283; Phillips v. Sensenich, 134 O. G., 1806, 31 App. D. C., 159.

It is urged by appellant that he should not be put to the expense of contesting the interference where there is doubt as to whether his opponent "can make such a statement under oath." In answer to this contention it is noted that the issue in the interference includes both method and article claims, and the interference would continue as to the former claims, even if this ground of the motion to dissolve were granted, also that Harmatta has filed a preliminary statement in which he alleges that he is the inventor of the issue in the interference. In the latter respect this case is similar to that of Silverman v. Hendrickson, *supra*.

Appellant suggests that the interference should be suspended, at least, and Harmatta required to file a supplemental oath.

In the case of Rowe v. Brinkmann, 133 O. G., 515, where the original oath of Brinkmann was defective, a motion of Rowe to dissolve the interference based upon this ground was refused transmission but it was directed by the Commissioner upon appeal that the interference be suspended and a proper oath required

for the reason that "Brinkmann had filed no preliminary statement." In the present case, as stated above, Harmatta has filed a proper preliminary statement.

The decision of the examiner of interferences is affirmed.

E. B. MOORE,
Commissioner.

December 3, 1910.

Intf. No. 31,792. Paper No. 24.

Washington, December 3, 1910.

In the matter of the Interference of

RIETZEL

vs.

HARMATTA.

INTERFERENCE No. 31,792.

APPEAL ON MOTION.

SIR:

You are hereby informed that the decision of the Examiner of Interferences has been affirmed by the Commissioner. Please find enclosed herewith a copy of the decision.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

F

Adolph F. Rietzel,
c/o Townsend & Decker,
149 Broadway,
New York City.

Johann Harmatta,
c/o O. E. Duffy & Son,
612 F St. N.W.,
Washington, D. C.

R.A.J.—2—253.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

Dec. 14, 1910.

BEFORE THE PRIMARY EXAMINER, DIVISION 3.

IN RE INTERFERENCE 31,792.

RIETZEL

vs.

HARMATTA.

U. S. Patent Office.
Dec. 14, 1910.
Mailed.

A. F. Rietzel, c/o Townsend and Decker, 149 B'way, N. Y. City.
Johann Harmatta, O. E. Duffy, and Son., 612 F St., N.W., Washington, D. C.

Please find below a communication from the Examiner in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1759

A hearing on Rietzel's motion for dissolution will be given by the Primary Examiner, Thursday, Jan. 5, 1911, at 10 A.M. in Room 173.

WM. J. RICH,
Examiner, Division C.

Docket clerk.
Dec. 23, 1910.
U. S. Patent Office.

Intf. No. 31,792, Paper No. 26.

IN THE UNITED STATES PATENT OFFICE.

INTERFERENCE No. 31,792.

ADOLPH F. RIETZEL.

vs.

JOHANN HARMATTA.

ON APPEAL TO THE COMMISSIONER OF PATENTS.

NOW COMES ADOLPH F. RIETZEL by his attorneys and moves for a rehearing of his appeal decided by the Commissioner of Patents December 3rd, 1910, upon the following grounds:

I.

The Commissioner arrived at his conclusion through overlooking the controlling effect of the fact that in making his original application for patent Harmatta swore only that he believed himself to be the original, first and sole inventor of a process of and apparatus for manufacturing metal articles, and did not swear that he believed himself to be the first and sole inventor of the metal article itself, and has never filed any oath or made any affidavit that could be lawfully taken as a substitute for a formal oath, that he believes himself to be the first and original inventor of the article forming the subject of the fourth, fifth, sixth, seventh and eighth issues of the interference.

II.

The decision of the Commissioner was in direct conflict with Section 4892 of the revised Statutes requiring that an applicant making application for a patent upon a manufacture or improvement thereof shall make oath that he believes himself to be the first inventor thereof and does not know and does not believe that the same was ever before known or used, and the applicant Harmatta has never filed any oath to that effect in this case or any lawful substitute therefor.

III.

The decision of the Commissioner was reached through misapprehension as to the controlling effect of the previous decision in Silberman vs. Hendrickson, 99 O. G., 445, and of the fact that Harmatta has filed a preliminary statement. It was not thereby decided that a preliminary statement can supply the place of the oath required by Section 4892 of the Statutes as to all the statutory allegations, but only that a preliminary statement in which the inventor makes oath that he is the inventor of the matter in issue may stand in place of the application oath as to that fact.

IV.

The Commissioner arrived at his conclusion through misapprehension as to the controlling effect of said preliminary statement through overlooking the fact that said preliminary statement does not allege that the inventor believes himself to be the first inventor or discoverer of the manufacture or improvement of manufacture claimed in the fourth, fifth, sixth, seventh and eighth counts of the issue.

V.

The Commissioner arrived at an erroneous conclusion through failure to distinguish between the previously adjudicated cases, decided upon the case of a broadened or enlarged claim upon the

same statutory subject matter of invention sworn to by the original oath, and the case of a new claim upon different statutory subject matter to which no oath of any kind has been made.

VI.

The decision was in principle in direct conflict with Section 4904 of the Statutes, prescribing in what cases the Commissioner shall direct the Primary Examiner to proceed to determine the question of priority of invention and for the reason that Harmatta has not filed any complete application for patent for the article forming the subject of the counts 4, 5, 6, 7 and 8, conformably with Section 4892 of the Statutes and Section 46 of the Rules of Practice, specifying the facts to which the applicant shall make oath, and has not filed any complete application conforming to Section 30 of the Rules of Practice and to the Statutes.

VII.

The decision overlooked the controlling effect of the fact that the oath required to be filed by Harmatta in order to complete his application for a patent on the article forming the subject of counts 4, 5, 6, 7 and 8 of the issue is in law an original oath and that in the absence of such oath the declaration or continuance of an interference by the Commissioner is ultra vires and in conflict with Section 4904 of the Statutes, prescribing the cases in which the Commissioner shall proceed to determine the question of priority of invention.

VIII.

The decision overlooked the controlling effect of the fact that no oath has been at any time filed by Harmatta that he believes himself to be the first inventor of the article of manufacture forming the subject of the counts 4, 5, 6, 7 and 8, but that on the contrary he has in his original specification inferentially disclaimed being the first inventor of the article, for producing which he invented the apparatus and method for which he duly made application for patent.

IX.

In arriving at his conclusion the Commissioner overlooked the fact that the authorities cited by him in his decision do not warrant the declaration of an interference or the continuance of the same in cases where there is an entire absence of oath.

X.

The Commissioner arrived at his conclusion through misapprehension of the controlling effect of the decision in the case of Rennyson vs. Merritt, which was a case in which the applicant simply broadened his claims, confining them still to the statutory subject matter covered by his original oath.

XI.

The Commissioner arrived at his conclusion through misapprehension as to the controlling effect of the previous decision in the case of Kane vs. Brill & Adams, which dealt only with the case of a supplemental oath where the inventor had been required by the Examiner to amend his specification to make his device operative.

XII.

The Commissioner arrived at his conclusion through misapprehension of the controlling effect of the decision in the case of Ex parte Richards, which decided only that the requirement of a supplemental oath where claims were broadened would be postponed until after the interference, in view of hostility of the inventor to the assignee at the time.

XIII.

The decision was reached through misapprehension as to the controlling effect of the case of Auerbach vs. Gubing vs. Wiswell, 108 O. G. 289, for the reason that said decision was made upon the authority of Rennyson vs. Merritt and Kane vs. Brill & Adams, and like them, dealt with the case of an enlarged but not a different claim.

XIV.

The Commissioner reached his conclusion through misapprehension of the controlling effect of the decision in the case of Shubert vs. Monroe, 113 O. G. 283, which was not rendered upon any state of facts differing from the previous cases of Rennyson vs. Merritt and others cited with approval, and which was rendered upon a state of facts entirely different from those present in this case. The facts in Shubert vs. Monroe, so far as said decision shows on its face, differed only from the previous cases in that there was an absence of a notarial seal upon the supplemental oath. This case, like the others, was an appeal from the Primary Examiner after decision upon the question referred to him by the motion made in view of the absence of a supplemental oath. It was not therein decided that the question raised should not be referred to the Primary Examiner for his consideration.

XV.

The conclusion of the Commissioner was reached through misapprehension as to the controlling effect of the case of Phillips vs. Sensenich, in which the court simply refuses to undertake to review the exercise of discretion by the Commissioner in regulating the practice of the Patent Office as to supplemental oaths. It appears further from the decision that the amendment in question was "within the scope of the original application" and involved merely

Defendant's Exhibit No. 35.

EEG.

Letter No.
Intf. No. 31,792.—Paper No. 28.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

December 29, 1910.

In the matter of the Interference of

RIETZEL

vs.

HARMATTA.

INTERFERENCE No. 31,792.

REQUEST FOR REHEARING.

You are hereby informed that the decision of the Commissioner on the above request is as follows:

"This is a request by Rietzel for a rehearing of his appeal from that portion of the decision of the examiner of interferences refusing to transmit the third ground of his motion to dissolve the interference.

"It is well settled that the question of whether a supplemental oath should be required is an ex parte matter upon which the proper determination of priority is not dependent. In the preliminary statement of Harmatta, he alleged 'that he conceived the invention set forth in the declaration of interferences at the end of the year 1900.' This preliminary statement is believed to be sufficient for the continuation of the interference and the question of whether a supplemental oath should be filed will be determined by the primary examiner after the interference is concluded.

"The petition for rehearing is denied."

E. B. MOORE,
Commissioner.

December 29, 1910.
By direction of the Commissioner:
Very respectfully,

W. F. WOOLARD,
Chief Clerk.

F

Defendant's Exhibit No. 35.

Adolph F. Rietzel,
c/o Townsend & Decker,
149 Broadway,
New York City.
Johann Harmatta,
c/o O. E. Duffy & Son,
612 F St. N. W.,
Washington, D. C.

U. S. Patent Office,
Dec. 30, 1910.
Div. 3.

Serial No.
Paper No. 29.

Honorable Commissioner of Patents:

Please permit Messrs. Meyers, Cushman & Rea of Washington, D. C., to inspect the Interference file in the matter of Interference #31,792, Rietzel vs. Harmatta, and also permit Messrs. Meyers, Cushman & Rea to make copies of any papers contained therein.

Very respectfully,

O. E. Duffy & Son.

U. S. Patent Office,
Dec. 31, 1910.
Div. 3.

No. 30.

UNITED STATES PATENT OFFICE.

In re Interference:

Adolph Rietzel

vs.

Johann Harmatta.

No. 31,792.

Stipulation.

It is hereby stipulated and agreed by and between counsel for the respective parties, the Commissioner of Patents consenting, that the hearing of the motion to dissolve brought by Rietzel and now set for hearing on the 5th day of January, 1911, may be postponed to Thursday, February 2nd, 1911.

Townsend & Decker,
Attorneys for Rietzel
O. E. Duffy & Son,
Attorneys for Harmatta.

New York, N. Y., December 27, 1910.

Defendant's Exhibit No. 35.

2—253

Paper No. 31.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

Jan. 9, 1911.
Mailed " " "

BEFORE THE PRIMARY EXAMINER—DIVISION 3.

In re Interference:

RIETZEL

vs.

HARMATTA.

A. F. Rietzel, c/o Townsend and Decker 149 B'Way New York City.

J. Harmatta, c/o O. E. Duffy and Son., 612 F St., N. W., City.

Please find below a communication from the Examiner in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1759

The stipulation to postpone the hearing of the motion to dissolve, filed the 31st ult., is approved and the hearing is postponed until Thursday, Feb. 2, 1911, at 10.30 A. M.

WM. J. RICH,
Examiner Division 3.

Docket Clerk,
Jan. 7, 1911.
U. S. Patent Office.

31,792—32.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA

No. 31,792.

Messrs. Townsend & Decker,
No. 149 Broadway,
New York City, N. Y.

GENTLEMEN:

Please take notice that on Thursday, January 12, 1911, at 10 o'clock A. M., or as soon thereafter as counsel can be heard before

the Examiner of Interferences we shall move to have incorporated as issues in the above entitled interference claims 2, 3 and 4 of the patent to Adolph F. Rietzel, #928,701, dated July 20, 1909, as per the attached amendment.

In support of this motion we shall refer to the annexed affidavit of C. Hugh Duffy.

O. E. DUFFY & SON.

Washington, D. C., January 7th, 1911.

AFFIDAVIT OF SERVICE.

City of Washington, District of Columbia, ss:

C. Hugh Duffy being duly sworn deposes and says that he is of counsel for Johann Harmatta; that on Saturday January 7th 1911 he deposited with the Post Office authorities at Washington, D. C., and caused to be sent prepaid by registered mail a sealed envelope addressed to Messrs. Townsend & Decker, #149 Broadway, New York City, as per attached registered slip, which envelope contained a copy of the accompanying motion papers.

C. HUGH DUFFY.

Subscribed and sworn to before me this 7th day of January 1911.

F. A. MILLIGAN,
Notary Public.

(Seal)

P. O., Washington, D. C.
Jan. 7, 1911.

Letter No. 191787

Received for registration 3050, 19, from Station G, O. E. Duffy & Son, addressed to Messrs Townsend & Decker, N. Y., N. Y.
1 class postage prepaid. Postmaster, per B

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

To the Honorable Commissioner of Patents.

SIR:

Now comes Johann Harmatta by his attorneys and moves that claims 2, 3 and 4 of the patent to Adolph F. Rietzel, #928,701, dated July 20, 1909 be incorporated as counts 9, 10 and 11 in the above entitled interference, said claims being presented herewith as

an amendment to the application of Johann Harmatta, Serial No. 183,677, filed December 3rd 1903.

In support of this motion reference is made to the annexed affidavit of C. Hugh Duffy of counsel for Johann Harmatta.

O. E. DUFFY & SON,
Attorneys for Johann Harmatta.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

AFFIDAVIT.

C. Hugh Duffy being duly sworn deposes and says that he is of counsel for Johann Harmatta in the above entitled interference; that claims 2, 3 and 4 of the patent to Adolph F. Rietzel, #928,701, dated July 20, 1909 are clearly readable on the disclosure of the application of Johann Harmatta, party to the above entitled interference; that attorneys of record for Johann Harmatta did not receive instructions from their client Mr. Harmatta in order to bring this motion within the time specified by Rule 109; that inasmuch as the matter has been transmitted to the primary Examiner on motion brought by Rietzel and a hearing will be had before the primary Examiner on a motion to dissolve brought by Adolph F. Rietzel it is believed that Adolph F. Rietzel will in no way be inconvenienced or put to further expense or otherwise damaged by the incorporation of the claims 2, 3 and 4 of the said Rietzel patent as issues in this interference; that a determination of the issues now in interference would leave the entire controversy unsettled and unsatisfactory to either parties and a proper determination of the rights of the contesting parties cannot be had until the issues include the said claims 2, 3 and 4 of the said Rietzel patent; that attorneys were unable by reason of their lack of instructions to bring this motion at an earlier date; that to the best of affiant's knowledge this is the first motion that has been brought by Harmatta in his proceeding and that the motion is made in good faith and not for the purposes of delay.

C. HUGH DUFFY.

Sworn to and subscribed before me this 7th day of January 1911.

(Seal)

F. A. MILLIGAN,
Notary Public.

Defendant's Exhibit No. 35. 161

R.A.J. Letter No. 33.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Jan. 13, 1911.

RIETZEL

vs.

HARMATTA.

No. 31,792.

Examiner of Interferences.

SIR:

I hereby request jurisdiction of the above entitled interference for the purpose of considering the patentability of certain of the counts of the issue in connection with newly discovered references.

Very respectfully,

WM. J. RICH,
Examiner, Division 3.

2—224.—M.C.V. Paper No. 34.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Jan.14, 1911.
Mailed " " "

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

On January 7, 1911, Harmatta filed a motion to amend the issue of this interference by adding certain claims. The motion is not accompanied by a motion to transmit to the Primary Examiner but its transmission will be considered in order to save the moving party the inconvenience of bringing another motion therefor.

It appears that the Primary Examiner has jurisdiction of this case for the purpose of deciding a motion for dissolution upon which no hearing has as yet been had. It is considered, therefore, that the present motion, although late, should be transmitted to the Primary Examiner since it can be considered with the questions which he is already called upon to determine and no substantial extra delay will result in the prosecution of this interference.

Harmatta's motion to amend is transmitted to the Primary Examiner.

Proceeding stand suspended.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Jan. 14, 1911.
U. S. Patent Office.

31,792—35

WASHINGTON, D. C.,

January 14, 1911.

Hon. Commissioner of Patents,
Washington, D. C.

SIR:

In the matter of the Interference Rietzel vs. Harmatta, No. 31,792; in which Rietzel is a patentee and Harmatta an applicant.

In inspecting the file of this case we have seen a letter from the Primary Examiner requesting jurisdiction of the case to consider the counts of the interference in view of alleged newly discovered references.

We desire to call attention to the fact that the Rietzel Patent in this interference is now involved in infringement suits and that the question of patentability has been raised therein and will be considered more exhaustively, completely and finally that could be done by the tribunals of the Patent Office. For this reason we request that the Primary Examiner be directed not to consider such question of patentability at the present time, it being understood that should Harmatta prevail it could be urged at any time before the issuance of the patent while if Rietzel should succeed, the consideration of patentability would be a moot question, since he already has a patent.

Attention is also called to the fact that Harmatta could not raise the question of patentability since his opponent has a patent and if he raised it, the interference would, under the practice, be dissolved.

Very respectfully,

TOWNSEND & DECKER.

In view of the facts above stated it seems to me that the above request could well be granted without impairing the rights of either party, as far as the interference is concerned.

Very respectfully,

WM. J. RICH,
Examiner Division 3.

Jan. 14, 1910.

Approved,
Jan. 14, 1911.
C. C. BILLINGS,
First Assistant Commissioner.

2—253.—R.A.J. Paper No. 36.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

Jan. 18, 1911.
Mailed " " "

BEFORE THE PRIMARY EXAMINER, DIVISION 3.

IN RE INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

A. F. Rietzel C/o Townsend and Decker, 149 B'Way, N. Y. City.
J. Harmatta, C/o O. E. Duffy and Son, No. 612 F St., N. W., City.

Please find below a communication from the EXAMINER in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1759

Harmatta's motion to amend his application by inserting certain claims under Rule 109 will be heard in Room 173 on Thursday, Feb. 2, 1911, at 10.30 A. M., at the time of the hearing on Rietzel's motion to dissolve.

WM. J. RICH,
Examiner, Division 3.

Defendant's Exhibit No. 35.

Intf. No. 31,792. Paper No. 17.

Docket Clerk,
Jan. 18, 1911.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

APPEAL TO THE COMMISSIONER OF PATENTS.

The party Rietzel to the above interference hereby appeals to the Commissioner of Patents in person from the decision of the Examiner of Interferences rendered January 14, 1911, transmitting to the Primary Examiner the motion filed by Harmatta to amend the issue of the interference by adding certain claims.

The following are assigned as the reasons of appeal:

It was error to transmit to the Primary Examiner Harmatta's motion to amend for the following reasons:

(a) That the motion was not brought within the time allowed by the Rule for bringing such motions.

(b) That the motion was brought outside of the time allowed by the Rule and no sufficient showing was made why the motion could not have been brought earlier.

(c) That the transmission of the motion was opposed by the party Reitzel, which face does not appear from the said decision of the Examiner of Interferences.

It was error to hold that the motion should be transmitted because a motion to dissolve in this same case is awaiting hearing, for the reason that this is not a sufficient or recognized excuse for bringing a motion after the time allowed by the Rule.

It was error to hold that because the Primary Examiner has jurisdiction of the case for the purpose of deciding another motion that he should be given jurisdiction to decide this motion, which is brought far outside of the time allowed by the Rule.

TOWNSEND & DECKER,
Attorneys for Rietzel.

New York, January 17, 1911.

2—201.—*O* Intf. No. 31,792—Paper No. 18.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON,

January 18, 1911.

Sir:

In case of

REITZEL

vs.

HARMATTA,

INTERFERENCE No. 31,792.

APPEAL BY REITZEL ON MOTION,

will be heard by the Commissioner on the 24th day of January, 1911.

The hearings will commence at ten o'clock, and as soon as the argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes.

Motions, thirty minutes, each side.

Interference appeals, final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

The appellant shall have the right to open and conclude in interference cases, and in such case a full and fair opening must be made.

Briefs in interference appeals must be filed in accordance with the provisions of Rule 147.

Respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1961

To All parties.

Intf. No. 31,792. Paper No. 19

THE WESTERN UNION TELEGRAPH COMPANY.

Mail Room,
Jan. 23, 1911.
U. S. Patent Office.

1598 1036

Received at 4C Cr 38 NL

Jacksonville, Fla., 22.

Honorable Commissioner of Patents,
Washn D. C.

Just received notice here of appeal to Commissioner to be heard twenty fourth inst Rietzel versus Harmatto Welding process Impossible to attend and request extension fifteen days Have wired opposing counsel requesting them to agree to this extension.

O. E. DUFFY & SON.

Docket Clerk,
Jan. 24, 1911.
U. S. Patent Office.

Intf. No. 31,792. Paper No. 20. 40

UNITED STATES PATENT OFFICE,

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

BEFORE THE HONORABLE COMMISSIONER OF PATENTS ON APPEAL FROM THE EXAMINER OF INTERFERENCES' DECISION TRANSMITTING HARMATTA'S MOTION TO AMEND.

BRIEF FOR ADOLPH F. RIETZEL.

THIS CASE comes up on appeal by the party RIETZEL to the above entitled Interference from a decision of the Examiner of Interferences rendered January 14th, 1911, transmitting the motion to amend the issue of the Interference brought by Harmatta.

The Interference is between Adolph F. Rietzel, a patentee, and Johann Harmatta, who has filed an application in which certain claims of the Rietzel patent are incorporated.

On January 7th, 1911, over six months after the preliminary statements in the above Interference were approved, the party HARMATTA filed a motion to amend the issue of this Interfer-

ence by adding certain additional claims which he copies from the patent issued to Rietzel. This motion is not accompanied by any excuse or showing to explain the delay in bringing the motion other than that the attorneys for Harmatta "did not receive instructions from their client, Mr. Harmatta, in order to bring this motion within the time specified by Rule 109". They do not state when they did receive their instructions, why they themselves could not have brought the motion, why they could not have brought the motion at an earlier date, nor in fact any reason whatever to in any way explain their lack of diligence in presenting the motion.

The party HARMATTA has had constructive notice of the Rietzel patent for about a year and a half and he deliberately copied certain claims of this Rietzel patent for the purpose of Interference. The Rietzel patent was issued some nine months before the declaration of interference and the party HARMATTA assuredly knew of all the claims in the Rietzel patent when he deliberately copied but some of them and he now attempts, after a lapse of over six months from the time of approval of the preliminary statements, to come in and add certain other claims of the existence of which he was aware at the time of making the original claims. Further, he makes this motion far outside of the time allowed by the Rule and without attempting to make any showing whatever to excuse the delay.

Rule 109 requires that a motion to amend shall be presented within thirty days after the preliminary statements of the parties have been approved and as regards this time requirement would seem to be more mandatory than the Rule 122, which states that motions for dissolution should, *if possible,* be made not later than the thirtieth day after the statements of the parties have been approved. The purpose of Rule 109 is to permit a party to an interference to add additional claims from an opponent's case after he has had an opportunity to inspect his opponent's case, and as was held in Sutton, Steele & Steele, 121 O. G. 1012, if he fails to take advantage of that Rule he looses the right to contest the question of priority as to the additional claims made by his opponent.

Harmatta had ample time before the thirty day period allowed by the Rule expired, to include all counts in the Interference which he thought he could make, and in fact all such counts should have been included when he originally copied some of the claims of the Rietzel patent, as at that time he had access to the patent and knew of all the claims made therein. As he made his election, having full knowledge of all the claims in the patent, he has now waived his right to contest any additional claims and his present motion brought far outside of the time allowed by the Rule, should not be transmitted, as was held in the case of Scott vs. Emmet vs. Hewett, 116 O. G. 1184.

This matter, it is contended, comes well within a decision rendered by the present Commissioner of Patents, Mr. Moore, in Mattice vs. Langworthy, 132 O. G. 678, in which it was held:

> "A motion to amend under Rule 109 brought after the thirty days allowed by the Rule and accompanied by no excuse for the delay is entitled to no consideration and should not be transmitted."

Also in Potter vs. Van Vleck vs. Thomson, 95 O. G. 2484, it was held:

> "In order to warrant transmitting a motion filed after the twenty days allowed by the Rule, it must be satisfactorily explained why it was not possible to bring it within the time. The fact that the reasons for it did not occur to the party bringing it when the information was within his reach is not a sufficient excuse."

Harmatta could have brought the present motion within the time allowed by the Rules just as well as he can bring it now, over five months after the time has expired, and in fact if he had any contention that he could make the claims set forth in the present motion, he should have made them when copying his original claims from the Rietzel patent, as the Rietzel patent was under his notice at that time and he had full knowledge of all the claims of the patent.

This case, that is where a party deliberately copies claims of a patent to provoke an interference, is entirely different from one in which two applicants are involved in which latter case neither one knows of the claims involved in the application of the other until after the preliminary statements are approved and each can obtain copies of his opponent's application.

It is now nearly twelve months since the time that the Rietzel patent was specifically brought to Harmatta's attention and he had ample time between the time of calling the patent to his attention and the time he copied his first claims to decide just what claims he could contest in the Interference and in view of this long time within which the information was at his hand his present motion to add additional claims not originally copied from the Rietzel patent should not be transmitted in view of the lateness with which the motion is brought and the absence and impossibility of any valid excuse for the delay.

It is contended that the Examiner of Interferences has gravely abused his discretion in transmitting the motion in view of the facts and without any excuse being given for the delay. The Examiner of Interferences evidently takes the view that because there is a motion to dissolve pending, that this is sufficient to excuse the delay in presenting the present motion to amend. This has been repeatedly held to be an insufficient excuse as is evidenced by numerous decisions on this point, among which may be noted the following:

Perrussel vs. Wichmann, 99 O. G. 2970, in which it was held:

"The fact that a motion to dissolved under Rule 122 is pending does not prevent the filing of a motion to amend under Rule 109 or excuse delay in filing such a motion."

Hall vs. Latta, 59 O. G. 1431, in which it was held:

"The pendency of other motions in an Interference is no excuse for delaying a motion to dissolve the Interference beyond the twenty days limited by the Rule."

It has been repeatedly held that the Examiner of Interferences should only consider whether the motion is brought within the time allowed by the Rule and is in proper form and it cannot be see how the Examiner can abrogate such holdings and the strict requirements of the Rule where there has been absolutely no showing made to warrant dispensing with the strict requirements of the Rule.

The practice as regards Transmission under Rule 109 closely follows that under Rule 122 except it is contended that the time limit in Rule 122 is more lenient than that specified in Rule 109 and therefore the showing to excuse delay under Rule 109 should be more thorough and convincing than that necessary under Rule 122. If the Examiner of Interferences' decision in this case transmitting Harmatta's motion to amend, brought late and unexcused, merely because the motion to dissolve is pending, is tenable, then it amounts to establishing, as a Rule of Practice, that

A party in an interference proceeding, provided there is a motion to dissolve pending, can bring any other motions allowed by the Rules at any time outside of the time limit required by the Rules, provided the motion is brought before the hearing on the motion to dissolve, and in such cases he will not be required to excuse his delay in presenting the second motion.

A fact which does not appear from the Examiner of Interferences' decision is that the transmission of Harmatta's motion to amend was vigorously opposed by Rietzel at the hearing before the Examiner of Interferences on the ground that the motion was brought along after the time allowed by the Rule and no sufficient showing was made to excuse the delay, and for this reason alone, as was held in Townsend vs. Copeland vs. Robinson, 124 O. G. 1845, the transmission should be refused.

In the matter of excusable and inexcusable delay in bringing motions such as the present one, the burden is entirely upon the party who brings the motion to show that he went diligently to work on his case at the proper time to discover whether a motion should be brought and when he does not or cannot make a proper excuse, it is thought that the Examiner of Interferences gravely abuses his discretion when he overlooks the lack of an excuse and transmits the motion. What constitutes excusable and inexcusable delay is further clearly set forth in McKee vs. Baker, 120 O. G. 657, in which it was held:

"Where it is not shown that a party went diligently to work upon his case at the proper time to discover whether a motion for dissolution should be brought nor that he was prevented from making the necessary investigation and bringing the motion within the period fixed by the rules, HELD that the motion should not be transmitted."

"The rule requiring motions to be brought within a fixed time is a wholesome one, and its enforcement requires that motions be not accepted when brought after the expiration of that time except where circumstances are shown which made it impossible to bring the motion within the regular period or under which the party could not reasonably be expected to have brought it therein."

In view of the peculiar and exacting facts presented in this matter, it is respectfully submitted that there has been a clear abuse of discretion on the part of the Examiner of Interferences in transmitting Harmatta's motion to amend and it is respectfully requested that such decision of the Examiner of Interferences be reversed.

TOWNSEND & DECKER,
Attorneys for Rietzel.

New York, Jan. 19th, 1911.

Recorded Vol. 100, page 131. Intf. No. 31,792. Paper No. 21, 41.
January 24, 1911. S.M.B.

IN THE UNITED STATES PATENT OFFICE.

PATENT INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

APPEAL ON MOTION.

ELECTRIC WELDING.

Application of Adolph F. Rietzel filed February 24, 1905, No. 427,081.

Application of Johann Harmatta filed December 3, 1903, No. 183,677.

Messrs. Townsend & Decker for Rietzel.
O. E. Duffy & Son for Harmatta.

This is an appeal from the decision of the examiner of interferences transmitting a motion by Harmatta to amend the issue by adding three claims contained in an amendment accompanying the motion.

The party Rietzel is a patentee and Harmatta an applicant. The

three claims which Harmatta seeks to have added to the issue are copied from the Rietzel patent. Transmission of the motion is opposed on the ground that no excuse has been shown by Harmatta for the delay in bringing this motion. As pointed out by the examiner of interferences, however, the primary examiner now has jurisdiction of the case for the purpose of considering a motion for dissolution and the additional delay incident to a determination of the present motion would be insignificant under the circumstances.

Furthermore, Harmatta should be given every reasonable opportunity for securing in this interference an adjudication on all claims which may be properly made in his application, since Rietzel is a patentee and there will therefore be no opportunity after the termination of the interference for the office to reject any claims in the Rietzel patent which may be unpatentable over the present issue, should Harmatta prevail in this proceeding.

It does not appear that the transmission of the present motion will prejudice any rights of the opposing party.

The decision of the examiner of interferences is affirmed.

E. B. MOORE,
Commissioner.

January 25, 1911.

EEG. Intf. No. 31,792. Paper No. 22.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON,

January 26, 1911.

In the matter of the Interference of

RIETZEL

vs.

HARMATTA.

INTF. No. 31,792.

APPEAL ON MOTION.

Sir:

Your are hereby informed that the decision of the Examiner of Interferences has been affirmed by the Commissioner. Please find enclosed herewith a copy of the decision.

Defendant's Exhibit No. 35.

By direction of the Commissioner:
Very respectfully,

W. F. WOOLARD,
Chief Clerk.
F

Adolph F. Rietzel,
c/o Townsend & Decker,
149 Broadway,
New York City.

Johann Harmatta,
c/o O. E. Duffy & Son,
612 F St., N. W.,
Washington, D. C.

Docket Clerk.
Jan. 27, 1911.
U. S. Patent Office.

31,792—23.

Mail Room.
Jan. 27, 1911.
U. S. Patent Office.

POWER OF ATTORNEY.

In the matter of the Interference Adolph F. Rietzel vs. Johann Harmatta, No. 31792, in which some of the claims of my United States patent No. 928,701, dated July 20, 1909, are involved, I hereby appoint Henry C. Townsend and Charles F. Tischner, Jr., constituting the firm of Townsend & Decker, of 149 Broadway, New York, New York, my attorneys, with full power to prosecute said Interference, to take all and any actions therein and to transact all business in the Patent Office connected therewith, hereby ratifying and confirming all and any actions heretofore taken by either or both of said parties.

ADOLPH F. RIETZEL.

The undersigned, Thomson Electric Welding Company, assignees of Adolph F. Rietzel, hereby ratify and confirm the above action and power.

(Seal)

THOMSON ELECTRIC WELDING CO.
By W. D. DODGE, *Secretary.*

CHART

TOO

LARGE

FOR

FILMING

U. S. Patent Office. 44.
Feb. 2, 1911.
Div. 3.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE PRIMARY EXAMINER.

In re Interference:

ADOLPH F. RIETZEL.

vs.

JOHANN HARMATTA.

No. 31,792.

BRIEF FOR RIETZEL ON MOTION TO DISSOLVE.

This is a motion by the party Rietzel to dissolve the above interference for the reason that the party Harmatta has no right to make the claims constituting the subject-matter of the interference.

On page 1 of Harmatta's substitute specification, filed May 14, 1904, beginning with line 11, he describes what he says to be the ordinary systems of welding, in which he states that the objects to be welded are placed one on the other, the current passed from one to the other and after they have been brought to a welding heat they are finally pressed together to effect the desired union. On the following page, namely 2, he describes two figures, namely, Fig. 1 and 2, of a set of drawings filed with this substitute specification. The figures referred to are herewith reproduced by a tracing of the same, and marked for identification "A." Harmatta describes these figures on page 2 of his specification, above referred to as follows:

> "Figure 1 is a sectional view illustrating the electric welding of two comparatively thick sheets on the ordinary system.
> "Figure 2 is a like view showing what occurs when one of the sheets is thin."

On line 21 of the same page, he goes on to describe, more in detail, the apparatus shown in these figures in the following words:

> "As Figure 1 shows the electrodes *a b*, lie opposite each other, the sheets 1, 2 to be welded by the ordinary process being located between them. The sheets lie loosely upon each other, that is to say, they are not artificially pressed together, and the consequence is that they are separated by a layer of air 3."

only at the moment of this supply, at the place at which the welding is to be done." He stated in his substitute specification, above referred to, that it was the ordinary process to supply pressure after the supply of current. The Examiner cited a number of references which meet the invention of applying the pressure at the place at which the welding is to be done at the moment of the current supply, among which references may be mentioned the Thomson patent, No. 444,928. Harmatta, then, due to the citation of these references, canceled any claims broad enough to cover the application of pressure only at the time of the current supply and eliminated such method from his invention on account of it also being old in the art.

As Harmatta practically states in the lines above referred to that there is no patentable difference between the application of the pressure before and during the period of supplying the current, and the application of pressure only at the moment of current supply, and in fact there is no patentable difference, Harmatta has no right to make any claim founded upon the use of current and pressure, when, by the Examiner showing it to be old in the art to apply the pressure at the point of welding only at the moment of supplying the electric current, Harmatta canceled and disclaimed this method as his invention, the other equivalent is thereby absolutely met and Harmatta had no right to make any claims founded on such application of pressure and current. As he describes this last specific method as his invention, still less has he any right to make claims broad enough to include the use of an old apparatus and an old process, which he states were old in the art and therefore not his invention.

The specification of Harmatta stood with the disclaimer for nearly six years and not until he filed the amendments on Jan. 27th and March 30th, 1910, did he attempt to correct the specification by removing the disclaimer and broadening his claims. It appears nowhere that the insertion of the disclaimer was through inadvertence, accident or mistake, nor does it appear that the long delay was through any misapprehension of the applicant's rights. It is well settled that the correction of a mistake or error, if it can be made at all, may be lost by delay and particularly where intervening rights would be thereby effected. This cardinal principle of the patent law has been expounded so fully and forcibly in connection with litigated reissue patents that it is so well settled that it is not now necessary to cite authorities.

It is manifest that the correction or amendment of the specification and claims made by Harmatta can only avail him and can only be lawful by relating back to the date of the supposed error in disclaiming as new with him the broad art of welding in spots; but the rule as above stated, here intervenes to bar the proposed change for the reason which the correction which Harmatta now seeks to make affects the intervening rights of Rietzel as conferred upon him by the issuance of his patent.

The proposed correction further operates adversely upon the rights of Rietzel and his assignees as exercised by them for a period of nearly one year after the issuance of the Rietzel patent. Even in the case of the correction of a mere clerical error it has been held that such correction cannot take effect and relate back to the date of the error, if intervening rights would be thereby affected. This is stated to be the law in the foot-note to Sec. 639 of Robinson on Patents, citing *Woodworth vs. Hall*, (1846), 1 W. & M. 389; 2 Robb. 517. This was held to be the rule in the case of a mere clerical error on the part of the Patent Office. The same principle and rule applies with much more force in the case of a correction intended to broaden the scope to affect intervening rights, as has been over and over stated by the courts in its decisions upon reissue patents.

It is a matter of grave moment in determining whether the rights of Rietzel and his assignees are adversely affected at this late date to remember that the Harmatta British patent contains substantially the same disclaimer which he now seeks to wipe out of his United States application, and that the owners of the Rietzel invention have proceeded on their actual knowledge of that disclaimer ever since the Harmatta patent was cited in the course of the prosecution of the Rietzel application eventuating in his patent herein in interference.

We therefore contend that Harmatta is precluded from making the correction which he now seeks to make by reason of delay, by reason of intervening rights which would be adversely affected, by reason of not only the absence of a showing of inadvertence, accidet or mistake in the matter which he now seeks to correct as an error, but on the contrary a presumption (conclusive, not rebuttable) of the absence of inadvertence or mistake and arising from an express and formal declaration made in such terms that it is not possible to assume that any error or mistake actually existed in the making of that declaration.

Moreover, even if a patent should issue to Harmatta, that patent would have to be construed in the light of the disclaimer found in his British Patent, and so construed would obviously be invalid for the claims which he now seeks to make.

It is for the Patent Office to determine, therefore, whether it will continue this interference with a view to determining whether a patent shall be issued to Harmatta under circumstances such that, if the patent should issue, said patent would have to be declared invalid under the express authority of the decision of the United States Supreme Court in the case of *Ashcroft vs. Boston & Lowell Railroad Co.* (1877), 97 U. S. 189. In that case it was expressly held that where the foreign patent of an inventor contains a disclaimer of certain features, the American patent for the same invention must be limited in the same way. This is laid down as a broad and cardinal principle of the Patent Law as is apparent from the text of the decision. The case went up on a number of assignments of error, the first of which was:

"That the court erred in giving weight to the disclaimer of the supposed inventor as set forth in his English patent."

The patentee in this country, it appeared, took his original patents limited practically by the same disclaimer as appeared in the British patent, that is to say, they were comparatively narrow claims. One of them, however, was reissued and on that reissued patent a suit was founded. It appeared, further, that both the original and the reissued patent were granted for the same invention as the English patent. When reissued the patent contained no disclaimer of the kind mentioned in the English patent, though it was conceded that both the original and the reissued patent were granted for the same invention as the English patent.

The same is true in the present case and that concession in this case could not properly be withheld, for Harmatta has set forth in his original oath and by his preliminary statement that the invention for which he now seeks patent is the same as that of his English patent.

In the case decided by the Supreme Court, and now referred to, the court says, speaking of the disclaimer of the English patent and which in its nature was no more explicit than that of Harmatta:

"Explicit as that disclaimer is, still it is assigned for error by the complainant that the Circuit Judge erred in giving weight to it; but the court here is of the opinion that there is no merit in that objection. *Instead of that, the court decides that the patent in suit, in order that it may be held valid, must be construed in view of the disclaimer contained in that patent,* and he limited to the particular devices shown in the specification for effecting such recoil action of the steam."

We strenuously urge on the authority of this case that Harmatta is not entitled to make the claims of this interference.

TOWNSEND & DECKER,
Attorneys for Rietzel.

February 2, 1911.

Defendant's Exhibit No. 35.

RAJ 2—253 RAJ No. 45.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

Washington, D. C., Jun. 5, 1911
Mailed " " "

BEFORE THE PRIMARY EXAMINER, DIVISION 3.

IN RE INTERFERENCE 31,792.

RIETZEL

vs.

HARMATTA.

A. F. Rietzel,
c/o Townsend & Decker,
149 Broadway, N. Y. City.
Johann Harmatta,
c/o O. E. Duffy & Son,
612 F St., N.W., Washington, D. C.

Please find below a communication from the Examiner in regard to the above-cited case.

Very respectfully,
E. B. MOORE,
Commissioner of Patents.

6—1759

This interference is before the Primary Examiner in view of a motion made by Rietzel to dissolve and a motion made by Harmatta to add new counts under Rule 109.

The grounds of the motion to dissolve are—

(1) That Harmatta has no right to make claims corresponding to the counts of the interference issues inasmuch as he disclaimed the subject-matter thereof in his substitute specification filed May 14, 1904.

(2) That Harmatta has no right to make the claims corresponding to the counts of the interference for the reason that there is no patentable difference between carrying out any process of welding by applying pressure before and during the period of supplying the electric current and by applying pressure only at the moment of the electric current supply and that Harmatta has disclaimed the latter by certain amendments made to his specification.

The two grounds of the motion, as may be seen, are based on alleged disclaimers by Harmatta made in the application file. It is here noted that it appears questionable whether the acts of Har-

matta, alluded to by Rietzel, even if the contention be correct, can properly be termed "disclaimers" but since such word has been used by Rietzel and since the meaning is clear, whatever term may be used, such term will be employed in this decision.

Of the parties to this interference Harmatta filed his application Dec. 3, 1903 and Rietzel Feb. 24, 1905. Rietzel's application was allowed June 24, 1909 and patented July 20, 1909, while Harmatta's case was pending. March 22, 1910, certain claims of Rietzel's patent were suggested to Harmatta for purpose of interference, under Rule 96. Harmatta making such claims, the interference was declared.

The subject-matter of the interference involves what is called "spot" welding, wherein the parts to be joined (thin sheets), are electrically welded at certain spots or places instead of over their entire surface. In Rietzel's process projections are formed on one or both of the juxtaposed surfaces or a metal washer may be placed between such surfaces; metal electrodes are placed over such projections, an electric current is passed through the electrodes and pressure is exerted upon the pieces simultaneously with the passage of the electric current, one of the electrodes being forced against the pieces.

Harmatta's process is substantiaally the same as Rietzel's with this variation: no projections are formed upon the opposing surfaces but such surfaces are pressed together by the electrode as the current passes, thus forming the weld.

Although Rietzel does not disclose any means wherein the welding is accomplished without the presence of projections the claims in interference are of sufficient breadth to cover both his process and that of Harmatta.

Since the motion only alleges matter connected with Harmatta's application, it is unnecessary to refer more specifically to Rittzel's process or apparatus.

Harmatta's original specification contained the following statement of invention (line 7, page 1 to line 17, page 2):

> "My invention relates to a process of and apparatus for manufacturing metal articles of all kinds, in particular those of the thinnest sheet metal, by direct electric welding. The new process consists in one of the electrodes (or both of them) not only serving to feed the current, but also being employed for exercising a more or less strong pressure either before and during the period of supplying the electric current, or at the moment of this supply, at the place where the welding is to be done. The member which feeds the electricity is thus at the same time the tool, and in this manner the most favorable conditions of working possible are secured, since, as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough.

"According to none of the present known electric welding processes are the articles to be welded firmly pressed together during the welding operation by one or both electrodes for the purpose of favoring welding. Hitherto either no pressure has been extended at all, or it has been exercised at a certain distance from this place of welding, or at all events not centrally direct upon the electrodes pressing on the place to be heated. In short, hitherto direct electric welding pressure has never been exercised by means of the electrodes located in the direction of the current directly above the surface or point being welded."

By amendment of May 14, 1904, the entire specification was canceled and a new specification presented which contains the following: (line 3, page 1 to line 6, page 5).

"As well known, it is impossible, by means of the ordinary methods of electric welding, to produce a really sound seam between very thin metal sheets, that is to say, a seam which is perfect at every part, without there being any fusing or burning away of the material being welded."

The reason of this I have ascertained to be as follows:

"On the ordinary systems of welding it is the practice at once to lead a current to the objects to be welded (such as iron bars, hoops, chain links, or the like), whereby, in consequence of the thinner or thicker layer of air, which is always present between the two objects, vigorous sparking occurs. There is, so to say, a line of sparks or an arc formed, which persists until the objects being welded have been brought to melting heat by the electric current, whereupon they are finally pressed together to effect the desired union.

"This well-known method, therefore, does not really differ from the ordinary method of welding at the fire, except that instead of the gases of combustion of the fuel, the electric current is employed to heat the bodies to be welded. Once the welding heat is reached, however, the final union of the bodies in either case is effected by mechanical pressure (pressing or hammering).

* * * * * * *

"Fig. 1 is a sectional view illustrating the electric welding of two comparatively thick sheets on the ordinary system.

"Fig. 2 is a like view showing what occurs when one of the sheets is thin.

* * * * * * *

"As Fig. 1 shows, the electrodes a b lie opposite each other, the sheets 1, 2 to be welded by the ordinary process being located between them. The sheets lie loosely upon each other, that is to say, they are not artificially pressed together, and the consequence is that they are separated by a layer of air 3.

"If now the electric circuit is completed through the two

electrodes and the sheets, and if the layer of air 3 is sufficiently thick, that is to say, the air resistance sufficiently great, there will be no sparks or arc formed between the two plates for the time being. If, however, the sheets are approached, as is unavoidable for the purpose of final union by pressing, hammering, etc., as already explained, a time must arrive when the air resistance between the two sheets to be welded is no longer sufficiently great to prevent equalization of the electricity at the two poles. Between the sheets, therefore, an arc or a line of sparks will be formel, and will continue until intimate contact has taken place between the two sheets. If, as shown in Fig. 1, the sheets are relatively thick, the arc which is formed will be of no consequence, since the slight fusing away at 4 caused by the arc, or the sparks, will not be sufficiently deep to penetrate the thick material. In fact there is even an advantage in the action of the sparks or arc in the case in question, since the cross section of the material is altered, whereby the two sheets are, as it were, scarfed at the place of welding, that is to say, the two cross sections are diminished at the seam to approximately the thickness of a single sheet, so that under certain conditions the two welded sheets have the same thickness at the joint as a single sheet.

"The case is altogether other when two thin sheets or articles are to be welded, or when a very thin object is to be welded to a thicker one, such as is shown, for instance, in Fig. 2. In this Figure it is assumed that the thick sheet 2 (which, as explained with reference to Fig. 1, is thick enough not to be penetrated completely by the arc at the point 4) is to be electrically welded to a very thin plate 5 by the ordinary process as above explained.

"On the approach of the objects 2, 5, at a certain moment, in consequence of the penetration of the layer of air 3, fusing away takes place at 4, owing to the arcs or sparks, and this fusing will extend to such depth that, although, as above explained, not injurious in the case of the sheet 2, it causes the thin sheet 5 to be completely perforated or burnt through. Thus the ordinary process of welding by means of an arc is quite impracticable with thin sheets.

"The essential feature of my invention is that in welding thin sheets the formation of such an arc, or sparking distance, which proves so disastrous, is wholly avoided, whereby a perfectly sound welded joint between such bodies, or between a very thin body and a thicker object, is attained.

"For the purpose of preventing the formation of the injurious arc, that is to say the sparking distance, I first submit the superposed metal objects to be welded 5, 6 (Figs. 4 and 5) to a certain pressure, the amount of which will depend upon the nature of the objects. This pressure I effect by means of the electrodes a b (Figs. 4 and 5) themselves, or with the aid of other suitable means."

The last quotation, except as to the last twelve lines, contains the matter alleged by Rietzel to constitute a disclaimer of the subject-matter of the interference issues, the contention being that the claims constituting the counts are of sufficient scope as to include the process of the disclaimer; that Harmatta has disclaimed the counts to that extent and consequently the claims in their entirety and hence he has no right to make such claims.

In considering this question it is necessary to ascertain exactly what, if anything, Harmatta did disclaim, for he cannot be presumed to have made a disclaimer unless the terms and the subject are so clear as to be practically indisputable.

The only disclosure in the alleged disclaimer, so far as it relates to the issues, that appears to be stated with certainty is, that electrodes contacting with the plates to be welded are used, and that the process to which Harmatta refers as "common" does not really differ from the ordinary method of welding at the fire. In such case he would apparently refer to ordinary welding wherein the parts are heated by an electric current to a welding temperature and then pressed or hammered together, this being analogous to the case where a workman heats two pieces together to a welding temperature and then welds them on an anvil. Hence, viewed from such a point, Harmatta cannot be said to have disclaimed the subject-matter of the interference counts, for should such be held, it would place such counts in the class of cases where in the invention is disclosed in many patents on ordinary fire welding and also in many prior patents on electric welding. If the claims are to be subjected to a scrutinizing interpretation to ascertain whether or not they are of such scope as to be anticipated by such patents the motion would be resolved into an allegation of non-patentability in view of the general state of the art; but as the motion alleged no such ground, such question of non-patentability cannot now be passed upon. Moreover, these counts, in their present terms, were allowed in the patent to Rietzel and it is to be assumed that the Examiner then in charge of the case duly considered the question of patentability and the fact of the allowance of the claims indicates either that he considered them clearly patentable or that the question of anticipation was not so clear in his mind as to warrant his rejection of them.

Furthermore to consider the counts specifically the following conditions are found.

Count 1 calls for electrically welding the plates at spots only by the application of pressure and heating current localized in such spots.

The disclaimer does not in any event disclose specifically the welding together of the pieces at *spots only* by the application of pressure and heating current *localized in such spots.*

Count 2, inter alia, calls for *the simultaneous application of current and pressure.*

This is not found in the disclaimer.

Count 3 falls in the same class as count 1.

Count 4 is specific to an article composed of metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of such plates being practically unaltered in their metallic condition and the spots on their meeting surfaces being separated from one another by distinct unwelded areas.

No such specific character of article is found in the disclaimer.

Counts 5, 6, 7 and 8, like count 4, contain mention of specific details not to be found in the disclaimer.

Careful consideration has been given to the decision *Ashcroft vs. Boston and Lowell Railroad* 97 U. S. 189, but it is not seen to have any bearing on the case in support of the motion. In this case the patentee, Naylor, obtained a British patent in which he stated that he made no claim to a certain construction, definitely specifying the same. He also obtained a patent in the United States, which patent was reissued, the reissue patent being that on which suit was brought. The Court held that the disclaimer in the British patent held good even in a suit on a patent in this country; and furthermore the Court considered that the disclaimer was made in view of another British patent, (to Beyer) wherein was found the disclaimed matter.

No such condition is found in the Harmatta application. The disclaimer is not sufficiently definite to be determined with certainty. Nor is any art disclosed which would indicate the subject-matter of the disclaimer.

In conclusion, it may be said that the decision of the Court of Appeals of the District of Columbia in *In re Orcutt* 141 O. G. 567, C.D., 1909, 334 appears to have an important bearing on this motion. In that case the conditions were very similar to those of the present interference. Orcutt's application was involved in an interference with a patent to McDonald and McDonald, granted during the pendency of Orcutt's application. After the patent was granted Orcutt copied claims therefrom and obtained an interference. Priority was awarded by the Examiner of Interferences to McDonald and McDonald. On appeal by Orcutt, the Examiners-in-Chief did not pass upon the question of priority but stated to the Commissioner under Rule 126 that they considered the claims unpatentable. The Primary Examiner, on reference, rejected the claims, which rejection was affirmed by the Commissioner. On appeal to the Court of Appeals, while the rejection was affirmed, the Court said:

> "In view of the inadvertence of the Patent Office in granting a patent to McDonald and McDonald for the claims of the issue, which patent is now beyond the control of the Office, it would probably have been the more equitable practice to have assumed patentability in the interference proceeding for the purpose of determining the question of priority between the two parties thereto. However, it was within the scope of the

Commissioner's authority to dissolve the interference, if convinced that the issue was not patentable. Should we declare the rejected claims patentable, the result would be that an interference would again be declared and the question of priority determined. It will thus be seen that the decision of the Commissioner dissolving the interference did not preclude Orcutt, if there was merit in his claims, from ultimately contesting the question of priority with the patentees, McDonald and McDonald."

Here we have a condition very analogous in some points to that of the present case. An applicant was involved in an interferece with a patent granted on a copending application. The question of patentability was raised (by the Examiners-in-Chief) after a decision of priority by the Examiner of Interferences; the anticipation was so clear as to cause a rejection of the claims by every tribunal; and yet, in their decision rejecting the claims, the Court stated that it would probably have been more equitable, under the circumstances, to have had a judgment of priority before the question of non-patentability was raised.

In the present case the question is not clear as to what is covered by the disclaimer, but even if less doubtful than it is, it would be contrary to the dictum of the decision quoted to dissolve the interference.

In regard to the motion made by Harmatta to add counts under the provisions of Rule 109, these counts being claims 2, 3 and 4 of Rietzel's patent, it is not seen why he is not as much entitled to make such claims as he was to make the claims now involved in the interference, they reading as well on his disclosure as the others.

The motion made by Rietzel to dissolve is denied.

The motion made by Harmatta to add additional claims under Rule 109 is granted.

No appeal lies from either part of this decision.

WM. J. RICH,
Examiner, Division 3.

Defendant's Exhibit No. 35.

Docket Clerk.
June 9, 1911.
U. S. Patent Office.
Mail Room.
June 9, 1911.
U. S. Patent Office.

#46.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE PRIMARY EXAMINER.

No. 31,792.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

MOTION.

NOW COMES Adolph F. Rietzel by his attorneys and moves for a rehearing of his Motion to Dissolve the Interference decided by the Examiner June 5th 1911 upon the grounds:—

1. That a question decisive of the case and duly argued by counsel was overlooked, to wit:

The question whether the British patent of Harmatta describes as an old method of welding, a process within the broad terms of the issue of this interference.

2. There was obvious misapprehension in treating the description of the Harmatta United States specification in the part disclosing the alleged disclaimer as being a reference to ordinary fire welding since in view of the context and the object of the invention said description can only refer to a process of electric welding and to one wherein the electric current is applied at a time with reference to the application of pressure, such as to produce what the applicant describes as a line of sparks or an arc.

ADOLPH F. RIETZEL.
BY TOWNSEND & DECKER,
Attorneys.

June 8, 1911.

Defendant's Exhibit No. 35. 187

RAJ 2—253. #47.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

June 12, 1911.
Mailed " " "

BEFORE THE PRIMARY EXAMINER, DIVISION 3.

IN RE INTERFERENCE 31,792.

RIETZEL
vs.
HARMATTA.

A. F. Rietzel, C/o Townsend and Decker, 149 B'Way New York City.
Johann Harmatta, C/o O. E. Duffy and Son, 612 F St., N.W., Washington, D. C.

Please find below a communication from the EXAMINER in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1759.

A motion is made by Rietzel for a rehearing of the motion to dissolve this interference, decided June 5, 1911, upon the following grounds.

"1 That a question decisive of the case and duly argued by counsel was overlooked, to wit:

The question whether the British patent of Harmatta describes as an old method of welding, a process within the broad terms of the issue of this interference.

2. There was obvious misapprehension in treating the description of the Harmatta United States specification in the part disclosing the alleged disclaimer as being a reference to ordinary fire welding since in view of the context and the object of the invention said description can only refer to a process of electric welding and to one wherein the electric current is applied at a time with reference to the application of pressure, such as to produce what the applicant describes as a line of sparks or an arc."

the Examiner of Interferences, we shall move that the time for filing preliminary statement of Johann Harmatta be extended to September 15th 1911.

In support of said motion we shall refer to the annexed affidavit of C. Hugh Duffy.

O. E. DUFFY & SON,
Attys. for Harmatta.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 31,792.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

To the Honorable Com. of Patents.
Sir:—

Now comes Johann Harmatta by his attorneys and moves that the time for filing his preliminary statement as to counts 9, 10 and 11 be extended to September 15th 1911.

O. E. DUFFY & SON,
Attorneys.

Washington, D. C.,
August 3rd, 1911.

AFFIDAVIT OF SERVICE.

City of Washington, District of Columbia, ss.:

C. Hugh Duffy being duly sworn, deposes and says that he is of counsel for Johann Harmatta in the matter of the Interference Rietzel vs. Harmatta, No. 31,792; that on Thursday, August 3rd 1911 he deposited with the Post Office authorities at Washington, D. C., and caused to be sent prepaid by registered mail a sealed envelope addressed to Messrs. Townsend & Decker, #149 Broadway, New York City, as per attached registry slip, which envelope contained a true copy of the accompanying motion papers.

C. HUGH DUFFY.

Subscribed and sworn to before me this 3rd day of August 1911.

HARRY A. HEGARTY,
Notary Public.

(Seal)

Defendant's Exhibit No. 35.

Aug. 3, 1911.

Letter No. 182442. P. O., Washington (Station G), D. C.
Received for registration , 191 , from
O. E. Duffy & Son
Addressed to Townsend & Decker
149 B Way N Y C
..1.....class postage prepaid Postmaster, per H

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 31,792.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

AFFIDAVIT.

To the Hon. Com. of Patents.
Sir:—

C. Hugh Duffy, being duly sworn deposes and says that he is of counsel for Johann Harmatta in the matter of the above entitled interference; that on June 14th 1911 affiant mailed to the Berlin agents of Johann Harmatta preliminary statement as to counts 9, 10 and 11 to be signed and executed by the said Harmatta; and that affiant is this day in receipt of a cablegram from the said Berlin agents of the said Harmatta requesting an extension of time for the filing of said preliminary statement as per Exhibit I attached hereto; that affiant is without direct advice as to the reason of said request for extension, but believes that the said Harmatta is away from the German Empire and therefore connot be reached in time to execute the said preliminary statement and have same on file by the 14th of August 1911; that this motion is made in good faith and not for the purposes of delay.

C. HUGH DUFFY,
Of Counsel for Harmatta.

Sworn to and subscribed before me this 3rd day of August 1911.

HARRY A. HEGARTY,
Notary Public.

(Seal)

Defendant's Exhibit No. 35.

POSTAL TELEGRAPH COMMERCIAL CABLES.

CABLEGRAM.

2 W SF11

Received at
Interior Department,
8th and F Streets, N.W.
(Where any reply should be sent.)

From Berlin Aug. 3rd-11.

190

(O. E.) Duffy,
Washington Distist Columbia,. (612 F st)
Harmatta extend time for filing statement.
Nawrockipatente. 10:22AM

Rietzel vs. Harmatta.
Interference No. 31,792.
Exhibit I.

Docket Clerk.
Aug. 8, 1911.
U. S. Patent Office.

31,792—50.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE NO. 31,792.

RIETZEL

vs.

HARMATTA.

STIPULATION.

Hon. Com. of Patents.
Sir:—

It is hereby stipulated and agreed by and between counsel for the respective parties that the time for filing the preliminary statement of Harmatta as to counts 9, 10 and 11 be extended to September 15th 1911.

O. E. DUFFY & SON,
Counsel for Harmatta.
TOWNSEND & DECKER,
Counsel for Rietzel.

S
("S" in margin.)
Washington, D. C.,
August 3rd, 1911.

HVB 2—224. Paper No. 51.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

August 10, 1911.
U. S. Patent Office,
Interference Division.
Aug. 10, 1911.
Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1652

On August 3, 1911, a motion was filed by Harmatta to extend the time for filing preliminary statements as to counts 9, 10, and 11, to September 15, 1911.

The record shows that on August 8, 1911, the parties entered into a stipulation agreeing to the extension asked by the motion. The stipulation is hereby approved and the time for filing preliminary statements in so far as the counts mentioned therein is concerned is extended to September 15, 1911.

In view of the approval of the stipulation no action upon the motion is necessary, and the motion is therefore dismissed.

H. E. STAUFFER,
Examiner of Interferences.

Defendant's Exhibit No. 35.

31,792—52.

Statement of Harmatta.
Filed Sept. 12, 1911.
Approved " 22, 1911.

IN THE UNITED STATES PATENT OFFICE.

INTERFERENCE IN THE U. S. PATENT OFFICE.

No. 31,792.

RIETZEL

vs.

HARMATTA.

PRELIMINARY STATEMENT OF JOHANN HARMATTA.

Johann Harmatta of Szepesváralja, in the Kingdom of Hungary, being duly affirmed, deposes and says that he is a party for the interference declared by the Commissioner of Patents on April 26th 1910 between his application for the United States for ELECTRIC WELDING, Serial No. 183,677, filed December 3rd 1903, and the patent to Adolph F. Rietzel, UNITING THE COMPONENT PARTS OF COMPOSITE SHEET METAL STRUCTURES, No. 928,701, patented July 20th 1909; that he conceived the invention set forth in the interference and the invention as defined by the three claims 10, 11 and 12 which are attached hereto and made a part hereof at the end of the year 1900 without having had then the opportunity of carrying out the invention disclosed in said claims 10, 11 and 12 for lack of time; that on or about the 15th day of September 1901, as he set working his own manufactory at Szepesváralja he first made drawings of the device for carrying out the process set forth in the said claims 10, 11 and 12; that in the first days of October 1901 he modified an old chain-welding machine so as to be able to carry out the process as set forth in the said claims 10, 11 and 12; that on the 15th up to the 20th day of October 1901, he had thin iron sheets welded and attachments welded upon sheet metal vessels successfully and on a manufacturing scale by his workmen Michael Hozza and Michael Tomaskiewicz, with the help of the process forming the object of the said claims 10, 11 and 12; said two workmen, who live here at Szepesváralja and who remember very well to have performed the said work at the mentioned time, being ready to give testimony in respect of the above facts; that in the course of November 1901 he mentioned said electric weldings of thin iron sheets to Mr. Hegenscheidt, Director General of the firm "Oberschlesische Eisen-

industrie A.G." (Upper Silesian Iron Industry Company of shareholders) at Gleiwitz, Silesia, Germany, in the presence of the Chief-Engineer of said Mr. Hegenscheidt, Mr. Wilhelm Fischer, who is at present Director, and that said gentlemen promised to inform the firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz, Silesia, Germany, about the said electric weldings of thin iron sheets; that the firm "Eisenhütte Silesia" received said information from said gentlemen, but raised doubts about the possibility of electrically welding such thin iron sheets without danger of burning through said metal sheets; that said firm "Eisenhütte Silesia", for the sake of verification, sent during the summer of the year 1902, to him (Harmatta) several blanks of sheet metal utensils, which he (Harmatta) welded, with the help of the process forming the object of said claims 10, 11 and 12, to the thorough satisfaction of said "Eisenhütte Silesia"; that when Mr. Schweisfurth of Paruschowitz, technical Director of the firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz, Silesia, Germany, came to him in order to look at the electric weldings and the modified chain-welding machine; and, as said Mr. Schweisfurth had convinced himself by ocular proof that it is very easy to weld such thin iron sheets with the help of the process forming the object of the said claims 10, 11 and 12, the said firm "Eisenhütte Silesia" (Silesia Iron Works) at Paruschowitz acquired the property of said process by a contract made with him (Harmatta) at the date of February 12th, 1902; and that from the month of January 1903 a great number of full-size machines adapted to carry out the welding process forming the object of said claims 10, 11 and 12 have been manufactured by said "Eisenhütte Silesia" for personal use and sale to others; the first new and full-size machine of this kind having been completed in the last days of January 1903 and first successfully operated and used in February 1903 for carrying out his process, in the works of the "Eisenhütte Silesia", in the village of Paruschowitz, Silesia (Germany).

That patents for such invention were applied for and obtained as follows:

Application filed in Germany, March 24th, 1903, published June 20th, 1904, patent not granted;

application filed in Sweden, October 12th, 1903, patent dated October 12th, 1903, No. 24035; published the 16th day of November 1907 and granted the 23rd day of January 1908;

application filed in France, October 13th, 1903, patent dated October 13th, 1903, No. 336187; published the 1st Day of March 1904 and granted the 7th day of January 1904;

application filed in Austria, October 14th, 1903, patent dated August 1st, 1905, No. 24335; published the 8th day of January 1905 and granted the 30th day of March 1906;

application filed in Denmark, October 14th, 1903 published May 16th, 1905, patent not granted;

application filed in Luxemburg, October 14th, 1903, patent dated October 15th, 1903, No. 5300; published the 14th day of October 1903 and granted the 14th day of October 1903;

application filed in Hungary, October 15th, 1903, patent dated October 15th, 1903, No. 31382; published the 29th day of April 1904 and granted the 24th day of August 1904;

application filed in Switzerland, October 15th, 1903, patent dated October 15th, 1903, No. 29723; published June 21st, 1905 and granted the 21st day of June 1905;

application filed in Belgium, October 16th, 1903, patent dated October 16th 1903, No. 173119; published the 20th day of January 1904 and granted the 31st day of October 1903;

application filed in Russia, October 20th, 1903, patent not granted;

application filed in Spain, October 20th, 1903, patent dated December 10th, 1903, No. 32726; published the 10th day of December 1903 and granted the 10th day of December 1903;

application filed in Italy, October 22nd, 1903, patent dated October 22nd, 1903, No. 180/117; published the 16th day of December 1903 and granted the 16th day of December 1903;

application filed in Great Britain, October 23rd, 1903, patent dated October 23rd, 1903, No. 22981/1903; published the 20th day of October 1904 and granted the 25th of August 1904;

application filed in Canada, December 4th, 1903, patent not granted;

application filed in Canada, December 4th, 1903, patent not granted;)

application filed in Japan, December 14th, 1903, patent dated April 6th, 1905, No. 8640; published the 6th day of April 1905 and granted the 6th day of April 1905;

application filed in Romania, July 11th, 1906, patent not granted;

That such invention was fully described in the following patent specifications; Sweden No. 24035; France No. 336187; Austria No. 24335; Hungary No. 31382; Switzerland No. 29723; Great Britain No. 22981/1903; Japan No. 8640.

The knowledge of such invention was first introduced in the United States on December 3rd, 1903 by the papers belonging to said U. S. application of Harmatta, serial number 183,677, for "Improvements in Electric Welding", filed December 3rd, 1903, said application papers having been sent by applicant to Messrs. Marion & Marion at Montreal, Canada, who filed said application to the United States Patent Office on December 3rd, 1903.

JOHANN HARMATTA.

American Consulate General Budapest Hungary, ss.:
S.S. N. S. 470/1911

Subscribed and affirmed to before me this 26th day of August, 1910.

R. E. MALLEN,
(Seal) *Vice and Deputy Consul General.*
Foreign Fee Stamp.

10. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

11. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

12. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

2—207. #53

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Sept. 13, 1911.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 31,792.

In the matter of the Interference of

HARMATTA

vs.

RIETZEL.

Sir:

You are hereby informed that the preliminary statement of Harmatta, has been received and filed.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

Harmatta,
c/o O. E. Duffy & Son,
612 F St., N.W.,
City.

6—2051

31,792—54.

UNITED STATES PATENT OFFICE.

In re Interference:

No. 31,792.

RIETZEL

vs.

HARMATTA.

Statement of Rietzel.
Filed Sept. 14, 1911.
Approved " 22, 1911.

PRELIMINARY STATEMENT OF ADOLPH F. RIETZEL AS TO COUNTS 9, 10 AND 11.

State of Connecticut, County of New London, ss.:

ADOLPH F. RIETZEL, of Charlestown, County of Washington and State of Rhode Island, being duly sworn, doth depose and say that he is a party to the interference declared by the Commissioner of Patents on the 26th day of April, 1910, between the patent of Adolph F. Rietzel, No. 928,701, dated July 20th, 1909, and an application for a similar invention filed by Johann Harmatta, the interference issue being amended June 12, 1911 by adding counts 9, 10, and 11.

That he conceived the invention set forth in the added counts 9, 10 and 11 during the latter part of October or first part of November 1897;

That, as near as deponent can at this time fix the date, the invention set forth in said added counts was successfully reduced to practice in the latter part of July 1898, and at the same time was first explained and disclosed to others;

That sketches of the application of the invention were made in the early part of June 1904 and from time to time since that date innumerable sketches have been made of the invention as applied to various articles of manufacture;

That the invention has been put to very extensive use in the manufacture of numerous sheet and other metal work of various kinds.

ADOLPH F. RIETZEL.

Sworn to before me this 21st day of August, 1911.

A. G. MARTIN,
Notary.

(Seal)

Defendant's Exhibit No. 35. 199

2—207. #55

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Sept. 15, 1911.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 31,792.

In the matter of the Interference of

HARMATTA

vs.

RIETZEL.

Sir:

You are hereby informed that the preliminary statement of Rietzel, has been received and filed.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,
Chief Clerk.

Rietzel,
c/o Townsend & Decker,
149 Broadway,
New York, N. Y.

6—2051

200

Defendant's Exhibit No. 35.

HVB

2—224.

Paper No. 56.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

September 25, 1911.

U. S. Patent Office.
Interference Division.
Sept. 25, 1911.
Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 31,792.

RIETZEL

vs.

JOHANN HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1652

This interference having been redeclared and new counts added on June 13, 1911, times for taking testimony and for final hearing are hereby reset as to all counts as follows:

Rietzel's testimony in chief to close November 25, 1911.
Harmatta's testimony to close December 26, 1911.
Rietzel's rebuttal testimony to close January 10, 1912.
Final hearing: March 13, 1912, at 11 A.M.

H. E. STAUFFER,
Examiner of Interferences.

Mail Room.
Oct. 17, 1911.
U. S. Patent Office.
Docket Clerk.
Oct. 17, 1911.
U. S. Patent Office. 31,792—57.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

New York, October 16th, 1911.

Messrs. O. E. Duffy & Son,
612 F Street, N.W.,
Washington, D. C.

Sirs:

PLEASE TAKE NOTICE that on Friday, October 20th 1911, at 10 o'clock a.m., or as soon thereafter as counsel may be heard, before the Examiner of Interferences, we shall move to transmit the accompanying motion for dissolution of this interference as regards the counts 9, 10 and 11, to the proper Primary Examiner for his determination and shall also move for a stay of proceedings pending the final determination of said motion.

TOWNSEND & DECKER,
Attorneys for Rietzel.

AFFIDAVIT OF SERVICE.

State of New York, County of New York, ss.:

FREDERICK B. TOWNSEND, being duly sworn, deposes and says: that he is a Clerk in the office of Messrs. Townsend & Decker, 149 Broadway, New York; that on Monday, October 16th 1911, he deposited with the Post-office authorities at New York City, N. Y., and caused to be sent prepaid by registered mail, a sealed envelope addressed to Messrs. O. E. Duffy & Son, 612 F. Street, N.W., Washington, D. C., as per attached registry slip, which envelope contained a copy of the accompanying motion papers.

FREDERICK B. TOWNSEND.

Defendant's Exhibit No. 35.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE PRIMARY EXAMINER.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

MOTION TO DISSOLVE.

NOW COMES ADOLPH F. RIETZEL, a party to the above entitled Interference, by his attorneys, and moves that the Interference as regards counts 9, 10 and 11 be dissolved on the following grounds:

FIRST: That the party Harmatta has no right to make the claims forming the subject of the Interference for the reason that he disclaimed the subject-matter of the counts of the Interference in his substitute specification filed May 14th 1904, beginning with the paragraph "As Fig. 1 shows" on page 2 and again repeated the disclaimer by his amendment to said specification filed May 18th 1906, and he did not withdraw said disclaimer by merely complying with the Examiner's requirement when he insisted on said requirement that "the description should be confined to applicant's process of welding and not to a discussion of prior processes and their disadvantages."

SECOND: That the party Harmatta has no right to make the claims forming the subject of the Interference for the reason that there is no patentable difference between carrying out any process of welding by applying pressure before and during the period of supplying the electric current and by applying pressure only at the moment of the electric current supply as stated at lines 4 to 10 on page 1 of Harmatta's original specification, and the applicant Harmatta by his amendments eliminating the method consisting in applying pressure only at the moment of current supply has disclaimed that method as his invention and therefore has no right to make any claim founded upon the use of pressure and current.

TOWNSEND & DECKER,
Attorneys.

New York, October 14th 1911.

LBF 2—224 Paper No. 58

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.,

October 20, 1911.
U. S. Patent Office.
Interference Division.
Oct. 20, 1911. Mailed

BEFORE THE EXAMINER OF INTERFERENCES

IN RE INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
E. B. MOORE,
Commissioner of Patents.

6—1652

Rietzel on October 17, 1911, presented a motion to transmit a motion to dissolve.

The motion is directed only to counts 9, 10 and 11, which counts were added to the interference by a redeclaration thereof on June 13, 1911.

It is well settled that motions to dissolve will not be transmitted with respect to counts which have been added under the provisions of Rule 109, where the parties have had full opportunity to raise any questions which may be raised upon motion to dissolve. In fact, Rule 109 as it now stands specifically states that such motion will not be transmitted.

The motion to transmit is denied.

Limit of appeal: November 3, 1911.

The taking of testimony is suspended.

H. E. STAUFFER,
Examiner of Interferences.

Defendant's Exhibit No. 35.

Docket Clerk.
Nov. 29, 1911.
U. S. Patent Office.

Intf. No. 31,792.

Paper No. 61

IN THE UNITED STATES PATENT OFFICE

RIETZEL

vs.

HARMATTA.

INTERFERENCE NO. 31,792.

BRIEF FOR HARMATTA ON RIETZEL'S APPEAL FROM THE EXAMINER OF INTERFERENCES DENIAL OF A MOTION TO TRANSMIT A MOTION TO DISSOLVE AS TO ADDED COUNTS.

Honorable Commissioner of Patents.

Sir:

This case comes before your Honor on appeal by Rietzel from a decision of the Examiner of Interferences, dated October 20, 1911, denying a motion to transmit a motion to dissolve with respect to counts (9, 10 and 11) added to the interference in a redeclaration thereof by the Primary Examiner June 13, 1911.

This interference was declared April 14, 1910, and involved eight claims of Rietzel's patent No. 928,701, dated July 20, 1909.

Rietzel's application was filed February 24, 1905.

Harmatta's application was filed December 3, 1903.

Preliminary statements were duly filed on behalf of both parties

Under date of September 9, 1910, Rietzel filed a motion for dissolution of the interference, setting up three grounds, which are as follows:

"FIRST, that the party Harmatta has no right to make the claims forming the subject of the interference for the reason that he disclaimed the subject matter of the counts of the interference in his substitute specification filed May 14, 1904, beginning with paragraph 'As Figure 1 shows,' on page 2, and again repeated the disclaimer by his amendment to said specification filed May 18, 1906, and he did not withdraw said disclaimer by merely complying with the Examiner's requirement when he inserted, on said requirement, that 'the description should be confined to applicant's process of welding, and not to a discussion of prior processes and their disadvantages.'

"SECOND, that the party Harmatta has no right to make the claims forming the subject of the interference for the reason that there is no patentable differences between carrying

out any process of welding by applying pressure before and during the period of supplying electric current, and applying pressure only at the moment of the electric current supply, as stated in lines 4-10 on page 1 of Harmatta's original specification, and the applicant Harmatta by his amendments eliminating the method consisting in applying pressure only at the moment of current supply has disclaimed that method as his invention, and therefore has no right to make any claim found upon the use of pressure and current.

"THIRD, that the party Harmatta has no right to make the claims forming the subject of counts 4, 5, 6, 7 and 8 of the issue of this interference for the reason that he has not filed the oath required by the Rule 48 and the Patent Statutes."

Under date of September 17, 1910 the Examiner of Interferences transmitted the motion as to the first two grounds, but denied it as to the third, following the practice, which is that the question of the sufficiency of the oath, either original or supplemental, is an ex parte matter which may be adjudicated after determination of the contest.

Under date of September 23, 1910 Rietzel appealed from this denial of his third ground.

Under date of November 23, 1910 Rietzel appealed from this denial of his third ground.

Under date of November 23, 1910 the Commissioner of Patents affirmed the decision of the Examiner of Interferences.

Under date of December 28, 1910 Rietzel asked for a re-hearing of his appeal.

Under date of December 29, 1910 the petition for re-hearing was denied.

Under date of December 14, 1910 Rietzel's motion for dissolution was set for hearing before the Primary Examiner as of the date January 5, 1911.

By stipulation this hearing was postponed until Thursday, February 2, 1911.

On January 7, 1911, Harmatta moved to add claims 2, 3 and 4 of the Rietzel patent in interference to the present issues, as counts 9, 10 and 11, which motion was duly transmitted under date of January 14, 1911, by the Examiner of Interferences.

Under date of January 18, 1911 the Primary Examiner set the motion of Harmatta to amend as of the date February 2, 1911, being the same time that had been set for Rietzel's hearing on his motion to dissolve.

Under date of January 18, 1911 Rietzel appealed from the ruling of the Examiner of Interferences transmitting the motion to amend brought by Harmatta to the Commissioner of Patents.

Under date of January 26, 1911 the Commissioner affirmed the decision of the Examiner of Interferences transmitting Harmatta's motion to amend.

After these various motions, and under date of February 2, 1911, this case was heard, both on Rietzel's motion to dissolve, and Harmatta's motion to amend, full argument being accorded both sides, and all of the questions raised by the motions were considered.

Under date of June 5, 1911, the Primary Examiner denied Rietzel's motion to dissolve, and granted Harmatta's motion to amend.

Under date of June 9, 1911, Rietzel moved to re-hear on the motion to dissolve.

Under date of June 12, 1911, the Primary Examiner denied the motion for re-hearing, and under the same date re-declared the interference, adding counts 9, 10 and 11 presented by Harmatta.

Harmatta, under date of September 12, 1911, filed his additional preliminary statement with respect to counts 10, 11 and 12.

Under date of September 14, 1911, Rietzel filed his statement as to the added counts.

Under date of September 25, 1911 the times for taking testimony was fixed.

Under date of October 17, 1911, Rietzel brought a motion to dissolve the interference as to counts 9, 10 and 11, alleging that the party Rietzel had had no hearing with respect to the question of the right of Harmatta to make the counts 9, 10 and 11, since the original motion for dissolution embraced the original eight counts of the issue.

This is the chronology of the actions in this case.

The ruling of the Examiner of Interferences in this case was correct.

Rule 109 provides that a party to an interference may amend his application by filing claims which, in his opinion should be made the basis of an interference between himself and other parties, and that on admission of such amendment the interference will be re-declared. Rule 109 finally points out that

> "Motions for dissolution will not be transmitted in regard thereto (i. e. the added claims) where the questions raised could have been disposed of in connection with the admission of the claims." (Paren's ours.)

So far as Harmatta is advised this is the rule of practice, and if it is, Rietzel is without standing in his attempt to transmit a motion for dissolution with respect to these added counts to the Primary Examiner.

The record of his case, as given above, shows that this interference has been pending since April 14, 1910, and for over a year and a half has been through a series of motions and appeals, all of which, with the exception of Harmatta's motion to amend, were initiated by Rietzel.

The record further shows that Harmatta, on January 7, 1911, moved to add these claims to the interference.

It seems absurd in the extreme for Rietzel to come in at this late

day and argue that he has had no opportunity to be heard on Harmatta's motion to add the counts, when the record shows that the Primary Examiner advised the parties that on February 2, 1911 the motions of Rietzel to dissolve, and of Harmatta to amend would be heard.

On that day (February 2, 1911) the parties were heard, and both the motion to dissolve, and the motion to amend were presented.

As the result of that hearing the motion to dissolve was denied, and the motion to amend was granted, so that for nearly a year Rietzel has been advised of Harmatta's motion to amend, he has had full opportunity to contest it, and in fact did contest it before the Examiner of Interference, and afterwards by appeal to the Commissioner when the Examiner of Interferences transmitted the motion to amend.

It comes with poor grace at this late day on the part of Rietzel to advance the childish argument that he has had no hearing upon the question of Harmatta's right to make the claims 9, 10 and 11.

On the contrary the present case shows a multiplicity of dilatory motions and appeals on behalf of Rietzel, the moving party, his tactics seeming rather such as seek delay than a speedy settling of the case on proofs and final hearing.

The decision relied on by the moving party, Rietzel, is without force for the reason that that ruling was made prior to the amendment of Rule 109, and it has been held in the decision of Gibson vs. Kitsee, 1909, C. D. 146 that the refusal to transmit motions to dissolve with respect to counts added under Rule 109 is in accord with the terms of that Rule, 109, which expressly prohibits the transmission of such a motion.

This was held in a case where the moving party alleged surprise at the Primary Examiner's decision and would seem to settle the present case beyond question, because Rietzel can set up no reason why the Rule, 109, should be disregarded, or its application modified.

Respectfully,
O. E. Duffy & Son,
Attorneys for Harmatta.

Defendant's Exhibit No. 35.

Docket Clerk.
Nov. 29, 1911.
U. S. Patent Office.

Intf. No. 31,792. Paper No. 62.

Division.
Nov. 29, 1911.
U. S. Patent Office.

UNITED STATES PATENT OFFICE.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

INTERFERENCE No. 31,792.

BEFORE THE HONORABLE COMMISSIONER OF PATENTS ON APPEAL FROM THE DECISION OF THE EXAMINER OF INTERFERENCES.

BRIEF FOR RIETZEL.

This case comes up on appeal by the party Rietzel from the decision of the Examiner of Interferences dated October 20th 1911, refusing to transmit to the Primary Examiner the motion to dissolve brought by Rietzel.

This motion relates to counts 9, 10 and 11 and is a substantial duplicate of the motion to dissolve previously brought with regard to the counts 1, 2, 3, 4, 5, 6, 7 and 8, the counts 9, 10 and 11 having been added since the bringing of that motion.

This motion should be heard and decided by the Primary Examiner as it does not anywhere appear in the record of this case that said Primary Examiner has considered the relation of the alleged disclaimer to the counts 9, 10 and 11, the Examiner stating in his decision dated June 5th 1911, by which the counts 9, 10 and 11 were permitted to be added, that Harmatta could make these claims for the reason that they read as well on his disclosure as the other claims, and it does not appear that the Examiner in any way considered the disclaimer with relation to these added counts or that Harmatta was entitled to make these claims in view of the alleged disclaimer made the subject of the present motion.

It is for the purpose of securing a definite decision upon this point that the present motion to dissolve should be transmitted and decided and the party Rietzel respectfully calls the Commissioner's attention to his Brief filed in connection with the motion for transmission heard before the Examiner of Interferences on the 20th day of October, 1911.

TOWNSEND & DECKER,
Attorneys.

Dated: Nov. 28th 1911.

November 29, 1911. Intf. No. 31,792. Paper No. 63.
Recorded Vol. 103. SET
Page 368.

IN THE UNITED STATES PATENT OFFICE.

RIETZEL

vs.

HARMATTA.

PATENT INTERFERENCE No. 31,792.

APPEAL ON MOTION.

ELECTRIC WELDING.

Patent granted Adolph F. Rietzel July 20, 1909, No. 928,701, on application filed February 24, 1905.
Application of Johann Harmatta filed December 3, 1903, No 183,677.

Messrs. Townsend & Decker for Rietzel.
Messrs. O. E. Duffy & Son for Harmatta.

This is an appeal by Rietzel from the decision of the examiner of interferences refusing to transmit a motion to dissolve the interference as to certain claims which were made the issue of the interference by virtue of a motion to add them, under the provisions of Rule 109.

It is well settled that when a motion is brought to add claims under the provisions of Rule 109, each of the parties must present before the Primary Examiner all the reasons affecting the question of the propriety of the insertion of the claims, and the consequent amendment of the issue in interference. It would only tend to delay proceedings to hear and determine a motion to add claims under Rule 109, and subsequently to transmit, hear and determine a motion to dissolve the interference as to the very claims added under the prior motion. The propriety of including these claims in the issue was affirmatively and finally decided upon the motion brought under Rule 109.

The Examiner of Interferences is right in refusing to transmit the present motion to dissolve and his decision is affirmed.

C. C. BILLINGS,
First Assistant Commissioner.

December 5, 1911.

1933

214 Defendant's Exhibit No. 35.

EEG Intf. No. 31,792. Paper No. 64. Letter No.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

Washington, December 6, 1911.

In the Matter of the Interference of

RIETZEL

vs.

HARMATTA.

INTF. No. 31,792.

APPEAL ON MOTION.

Sir:

You are hereby informed that the decision of the Examiner of Interferences has been affirmed by the First Assistant Commissioner. Please find enclosed herewith a copy of the decision.

By direction of the Commissioner:

Very respectfully,

W. F. WOOLARD,

Chief Clerk.

F

Adolph F. Rietzel,
c/o Townsend & Decker,
149 Broadway, New York City.
Johann Harmatta,
c/o O. E. Duffy & Son,
612 F St. N.W., Washington, D. C.

M.C.V. 2—224 Paper No. 65.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C.

Dec. 9, 1911.
U. S. Patent Office,
Interference Division,
Dec. 9, 1911, Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,
E. B. MOORE,
Commissioner of Patents.

6—1652

The First Assistant Commissioner having affirmed the decision of the Examiner of Interferences denying transmission of the motion for dissolution, filed by Rietzel on October 17, 1911, proceedings are this day resumed and times for taking testimony and for final hearing are reset as follows:

Rietzel's testimony in chief to close Feb. 9, 1912.
Harmatta's testimony to close March 11, 1912.
Rietzel's rebuttal testimony to close March 26, 1912.
Final hearing: May 28, 1912, at 11 A.M.

H. E. STAUFFER,
Examiner of Interferences.

Defendant's Exhibit No. 35.

Docket Clerk
Feb. 8, 1912.
U. S. Patent Office.

31,792—66

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

INTERFERENCE No. 31,792.

STIPULATION.

("S" and "notice" in margin.)

Hon. Commissioner of Patents.

Sir:

It is hereby stipulated and agreed between the parties to this interference through their respective counsel, the Commissioner of Patents consenting, owing to the absence of the party Rietzel probably in Europe, that the times now set for taking testimony and for final hearing may be reset so as to expire thirty days later.

TOWNSEND & DECKER,
Counsel for Rietzel.
O. E. DUFFY & SON,
Counsel for Harmatta.

New York, February 6th 1912.

LBF 2—224 Paper No. 67.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

February 10, 1912.

U. S. Patent Office.
Feb. 10, 1912.
Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 31,792

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1652

The stipulation filed February 8, 1912, is approved and the times herein are extended as follows:

Rietzel's testimony in chief to close March 11, 1912.

Harmatta's testimony to close April 11, 1912.

Rietzel's rebuttal testimony to close April 26, 1912.

Final hearing: June 28, 1912, at 11 A.M.

Notice is given, however, that no further extension of Rietzel's time to take testimony in chief will be granted without a verified showing of reasons why the testimony was not taken within the time hereinabove allowed.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Mar. 9, 1912.
U. S. Patent Office.

31,792—68.

March 9, 1912.

Hon. Commissioner of Patents,
Washington, D. C.
Sir:—

In re Interference:

RIETZEL

vs.

HARMATTA.

No. 31,792.

BEFORE THE EXAMINER OF INTERFERENCES.

We present herewith stipulation between the parties to the above interference requesting extension of time for taking testimony. In support of the request we beg to call attention to the accompanying affidavit of Charles F. Tischner, Jr.

Respectfully,

TOWNSEND & DECKER.

Docket Clerk.
Mar. 9, 1912.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 31,792.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

STIPULATION.

Hon. Commissioner of Patents.
Sir:—

It is hereby stipulated and agreed by and between the parties to this interference, through their respective counsel, the Commis-

sioner of Patents consenting, that the times now set for taking testimony and for final hearing be extended sixty (60) days.

("S" in margin.)

TOWNSEND & DECKER,
Counsel for Rietzel.
O. E. DUFFY & SON,
Counsel for Harmatta.

New York,
March 9th, 1912.

Docket Clerk.
Mar. 9, 1912.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

RIETZEL

vs.

HARMATTA.

No. 31,792.

IN SUPPORT OF REQUEST FOR EXTENSION OF TIME TO TAKE RIETZEL'S TESTIMONY-IN-CHIEF.

AFFIDAVIT.

District of Columbia, ss:

CHARLES F. TISCHNER, JR., being duly sworn, deposes and says that he is a member of the firm of Townsend & Decker, attorneys for the party Rietzel in the above-entitled interference; that deponent has this case in his personal charge; that for upwards of six months past negotiations have been pending for a settlement of the interference between the parties; that since the early part of December, 1911, and until about a week ago, deponent has been away from his office and, except for the time consumed in travel, has been in Berlin, Germany, negotiating for the purchase of the Harmatta invention involved in this interference for and on behalf of the owners of the Rietzel patent; that owing to such negotiations it has been impossible to take any testimony on behalf of Rietzel; that papers have been executed transferring the Harmatta application involved in this interference to the Thomson Electric Welding Co., owner of the Rietzel patent, but that such papers have not yet been received in this country; that, according to deponent's best knowledge and belief, such papers are now in

transit and should arrive within a short time; that it is desired to take testimony in the interference on behalf of the party Rietzel; that it is expected that such testimony can and will be taken and completed within the sixty days' extension of time now requested, and that the request is made in good faith and not for the purposes of delay.

CHAS. F. TISCHNER, JR.

Sworn to and subscribed before me this 9th day of March, 1912.

(Seal)

A. M. PARKINS,
Notary Public, D. C.

M.C.V. 2—224. Paper No. 69.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

March 11, 1912.

U. S. Patent Office,
Interference Division.
Mar. 11, 1912.
Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 31,792.

RIETZEL,

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1652

The stipulation filed March 9, 1912, is approved and the times herein are extended as follows:

Rietzel's testimony in chief to close May 11, 1912.
Harmatta's testimony to close June 11, 1912.
Rietzel's rebuttal testimony to close June 26, 1912.
Final hearing: August 27, 1912, at 11 A.M.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk. 70.
May 11, 1913.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE EXAMINER OF INTERFERENCES.

INTERFERENCE No. 31,792.

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

STIPULATION.

Hon. Commissioner of Patents.
Sir:

It is hereby stipulated and agreed by and between the parties to this interference, through their respective counsel, the Commissioner of Patents consenting, that the times now set for taking testimony and for final hearing be extended sixty (60) days.

("S" in margin.)

TOWNSEND & DECKER,
Counsel for Rietzel.
O. E. DUFFY & SON,
Counsel for Harmatta.

New York, May 10th, 1912.

M.C.V. 2—224. Paper No. 71.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

May 13, 1912.

U. S. Patent Office,
Interference Division.
May 13, 1913.
Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

Defendant's Exhibit No. 35.

The stipulation filed May 11, 1912, is approved and the times herein are extended as follows:

Rietzel's testimony in chief to close July 11, 1912.
Harmatta's testimony to close Aug. 12, 1912.
Rietzel's rebuttal testimony to close Aug. 27, 1912.
Final hearing: October 29, 1912, at 11 A.M.

R. E. MARINE,
Act. Examiner of Interferences.

Docket Clerk.
Jul. 17, 1912.
U. S. Patent Office.

31,792—72.

IN THE UNITED STATES PATENT OFFICE.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

Washington, D. C., July 15, 1912.

Messrs. Townsend & Decker,
Attorneys-at-Law,
149 Broadway,
New York, N. Y.

Sirs:—

Please take notice that on Tuesday, July 23rd 1912 at 10 o'clock A.M., or as soon thereafter as counsel may be heard before the Examiner of Interferences, we shall present the accompanying motion for judgment on the record in behalf of the party Harmatta.

O. E. DUFFY & SON,
Attorneys for Harmatta.

Service of the accompanying motion papers acknowledged this 16th day of July 1912.

TOWNSEND & DECKER,
Attorneys for Rietzel.

Docket Clerk.
Jul. 17, 1912.
U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

BEFORE THE HONORABLE EXAMINER OF INTERFERENCES.

In re Interference:

ADOLPH F. RIETZEL

vs.

JOHANN HARMATTA.

No. 31,792.

MOTION FOR JUDGMENT.

Now comes Johann Harmatta by his duly authorized attorneys and moves that judgment of priority be entered in favor of the party Harmatta for the reason that the time set by the Honorable Examiner of Interferences for the taking of testimony in behalf of the party Rietzel has expired and no testimony has been filed within the time set in behalf of the party Rietzel.

O. E. DUFFY & SON,
Attorneys for Harmatta.

Washington, D. C., July 15th, 1912.

Defendant's Exhibit No. 35.

M.C.V. 2—224. Paper No. 73.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

July 24, 1912.

U. S. Patent Office,
Interference Division.
Jul. 22, 1912.
Mailed.

BEFORE THE EXAMINER OF INTERFERENCES.

IN RE INTERFERENCE NO. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

6—1652

The motion filed by Harmatta on July 17, 1912, for judgment under Rule 119 is granted to the extent that judgment on the record will be rendered against Rietzel, the junior party, for the reason that he has failed to take any testimony within the time allowed for that purpose, unless he shall on or before August 3, 1912, show good and sufficient cause why such action should not be taken.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Jul. 25, 1912.
U. S. Patent Office.

31,792—74.

IN THE UNITED STATES PATENT OFFICE.

INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

To the Honorable Commissioner of Patents.
Sir:—

We hereby revoke all powers of attorney or authorities to inspect the Interference file in the above entitled case.

Respectfully,

O. E. DUFFY & SON,
Attys. for Harmatta.

HVB 2—224. Paper No. 75.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

August 7, 1912.
U. S. Patent Office,
Interference Division.
Aug. 7, 1912.
Mailed.

BEFORE THE EXAMINER OF INTERFERENCES

IN RE INTERFERENCE No. 31,792.

RIETZEL

vs.

HARMATTA.

Please find below a communication from the Examiner in charge of Interferences in regard to the above-cited case.

Very respectfully,

E. B. MOORE,
Commissioner of Patents.

Whereas, Rietzel, the junior party, has failed to make any showing why judgment on the record should not be entered against him, in view of his failure to take any testimony, and whereas the time allowed for such action has expired, pursuant to the notice in this case of July 24, 1912, priority of invention of the subject matter in issue is hereby awarded to Johann Harmatta, the senior party.

Limit of appeal: August 27, 1912.

H. E. STAUFFER,
Examiner of Interferences.

31,792.

RIETZEL

vs.

HARMATTA.

1.	APR	26 1910	Declaration Statements due June 27/10.
2.	May	9/10	Change of address
3.	"	31/10	Registered notice of intf. to patentee returned by P.O.
4.	June	1 –	Address of Reitzel requested of attorneys
5.	June	4/10	Letter from Atty for Rietzel
6.	"	8 "	Notice of intf. re-registered to Rietzel
7.	"	14 "	Stmt of Rietzel
8.	"	" "	Letter to "
9.	"	18/10	Registry return receipt.
10.	"	20 "	Stmt of Harmatta
11.	"	21 "	Letter to "
12.	July	2, "	Testimony set. Hearing Jan. 18/11
13.	July	6–10	Power to inspect
14.	Sept.	9–10	Motion to dissolve by Rietzel
15.	Sept.	14–10	Brief for Harmatta
16.	Sept.	17/10	Motion to transmit by Rietzel granted as to grounds (1) and (2) and denied as to ground 3 L.A. Sept. 27/10 Test'y Suspended
17.	"	23, "	Appeal to Comm'r by Rietzel on Motion
18.	"	23, "	Notice of Hearing,
19.	Oct.	26 "	Stipulation for postponement
20.	"	27 "	Notice of "
21.	Oct	26/10	Entry of Appearance.
22.	Nov.	23 "	Brief for Rietzel
23.	Dec.	3 "	Commr's decision
24.	"	" "	Notice of "
25.	Dec.	14 "	Hearing by Pr Examiner
26.	"	23 "	Petition by Rietzel for rehearing
27.	"	29 "	Commr's decision (paper # 26)
28.	"	" "	Notice of "

29.
30. Dec 31–1910 Stip. by Parties to extend time
31. Jan 9–1911 Hearing by Pr. Examiner
1. ———————
32. Jan 7/11 Motion by Harmatta to party to interference
33. Jan. 13/11 Request of Prim. Ex for jurisdiction
34. " 14 " Motion by Harmatta to amend transmitted
35. Jan 14,/11 Letter from Rietzel
16. Jan 18–1911 Hearing by Pr. Examiner
17. " " " Appeal by Rietzel on Motion
18. " " " Notice of hearing
19. " 23 " Request of Harmatta for postponement
20. " 24 " Brief for Rietzel
21. " 25 " Comm's decision
22. " 26 " Notice of "
43. Jan 27/11 Power of Atty
24. Feb 2–1911 Brief for Rietzel
25. June 5/11– Decision of Primary Examiner
26. " 9 " Motion
27. " 12 " Examiner's decision
48. " 13/11– Intf. redeclared. New Counts added. Statement due Aug. 14/11.
49. Aug 3/11 Motion to extend time by Harmatta
50. Aug 8/11 Stipulation to extend time
51. " 10 " Stip. approved. Statements (cts. 9, 10, 11) due Sept. 15/11. Motion dismissed.
52. Sept 12 " Statement of Harmatta
53. " 13 " Letter to "
54. " 14 " Statement of Rietzel
55. " 15 " Letter to "
56. " 25 " Times set as to all cts. F.H.Mar 13/12.
57. Oct 17/11 Motion to dissolve by Rietzel
58. Oct 20/11 Motion to dissolve by Rietzel denied transmission L.A. Nov. 3/11 Testy. Suspended.
59. Nov. 1 " Appeal by Rietzel on Motion
60. " " " Notice of hearing
61. Nov. 29, 1911 Brief for Harmatta
62. " " " Brief for Rietzel
63. Dec. 5 " Comm's decision
64. " 6 " Notice of "
65. " 9 " Proceeding resumed. Testy. set F H May 28/12
66. Feb 8/12 Stipulation to extend time
67. Feb 10 " Times extended. F. H. June 28/12.
68. Mch 9/12 Stipulation to extend time
69. " 11 " Times extended F.H Aug 27/12
70. May 11/12 Stipulation to extend time
71. " 13 " Times extended. F.H.Oct. 29/12.
72. July 17/12 Motion for Judgt. by Harmatta
73. " 24 " Motion granted O.C. against Rietzel Aug.3/12

74. " 25/12 Revocation of Authoritee to inspect. by Harmatta
75. Aug 7/ " Decided favor Harmatta.L.A.Aug 27/12.
Entered up Sep 11, 1912

WM. J. RICH,
Examr. Div. 3.

ATTORNEYS.

Adolph F. Rietzel,
c/o Townsend and Decker,
149 Broadway, New York, N. Y.

Johann Harmatta,
c/o O. E. Duffy & Son,
612 F St., N.W., City.

Entry of Appearance.
H. C. TOWNSEND.
C. F. TESCHNER, JR.

Defendant's Exhibit No. 36.

No 36 1918

2—391

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a photographic copy from the record of this office of an instrument of writing

Recorded April 5, 1912,

in

Liber A-ov, page 311.

Said record has been carefully compared with the original and is a correct transcript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 17th day of March, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Acting Commissioner of Patents.

1919

Assignment

WHEREAS, I, JOHANN HARWATTA, of Szombathely, Hungary, invented certain new and useful improvements in Electric Welding set forth in a certain application for letters patent of the United States, which application was filed in the United States Patent Office on or about the 3rd day of March 1903 and bears S. N. 143,677; and

WHEREAS, the THOMSON ELECTRIC WELDING COMPANY, a corporation duly organized and existing under the laws of the State of Massachusetts and having an office in the City of Lynn, Mass., is desirous of acquiring the said invention application for patent and Letters Patent to be granted for the same in and for the United States;

NOW THEREFORE, To All Whom It May Concern

Be it known that, for and in consideration of the sum of One (1) Dollar to me in hand paid by the THOMSON ELECTRIC WELDING COMPANY and other good and valuable consideration, the receipt of which is hereby acknowledged, I, the said JOHANN HARWATTA, have sold, assigned, transferred and set over and by these presents do sell, assign, transfer and set over unto the THOMSON ELECTRIC WELDING COMPANY, its successors and assigns, the entire right, title and interest in and

to the said invention, application for patent and Letters Patent to be issued for the same in and for the United States, the said invention, application for patent and letters patent together with any reissue or reissues or extension or extensions of the same to be held and enjoyed by the said THOMSON ELECTRIC WELDING COMPANY for its own use and behoof and for the use and behoof of its successors, assigns or other legal representatives to the full end of the term for which said

letters patent are or may be granted, reissued or extended. And I do hereby authorize and request the COMMISSIONER OF PATENTS of the UNITED STATES to issue the letters patent for said invention to the THOMSON ELECTRIC WELDING COMPANY as the sole owner thereof.

And I do further covenant and agree that I will render the said THOMSON ELECTRIC WELDING COMPANY, its successors, assigns or other legal representatives all assistance within my power to secure the grant of a patent or patents for said invention and that I will upon request execute all oaths or other papers which may be required or deemed necessary to obtain said patent or patents necessary in connection therewith.

And I do further covenant and agree that I will, at any time upon request, communicate to said THOMSON ELECTRIC WELDING COMPANY, its successors, assigns or other legal representatives, any facts relating to said invention and letters patent or the history thereof known to me and testify as to the same when requested to do so by the said THOMSON ELECTRIC WELDING COMPANY but at the expense of said Company for said services.

And I do further covenant and agree that should it be desired or necessary to file a division of said application that I will upon request sign and execute such application papers and do all other lawful acts as may be necessary to apply for patent for such divided matter without further compensation but at the expense of said assignee.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my seal at the City of Berlin, Germany, this Berlin day of 3 Febr. 1912.

WITNESSES: Johann Harmatta.

Henry Hasper.

Woldemar Haupt (OVER)

1951

-2-

[illegible] Acknowledgment.

United States Consulate
General of the United States of America
City of BERLIN Empire of Germany } s. s.
Berlin, Germany.

On this 3rd day of February 1912 before me personally appeared Johann Hermatta, to be personally known and known to me to be the individual described in and who executed the above instrument and who acknowledged to me that he executed the same for the purposes therein set forth.

Louis C. Dreyfus Jr.

CONSULATE GENERAL
OF THE UNITED STATES
BERLIN

Deputy Consul General of the United States of America at Berlin Germany.

No. 206.

Recorded April 5, 1912.

Defendant's Exhibit No. 37 1932

No 37

2-891

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of an instrument of writing

Recorded June 22, 1905,

in

Liber H-72, page 141.

Said record has been carefully compared with the original and is a correct transcript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 31st day of March, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Acting Commissioner of Patents.

1952 114

A S S I G N M E N T .

WHEREAS, I, ADOLPH F. RIETZEL, have invented certain new and useful improvements in Method of Electric Welding, which are set out in a certain application for Letters Patent of the United States, filed by me in the United States Patent Office, on the 24th day of February 1905, Application S. N. 247,081 and

WHEREAS, the THOMSON ELECTRIC WELDING COMPANY, a corporation organized and existing under the laws of the State of Maine, and having an office at Lynn, in the State of Massachusetts, is desirous of acquiring the entire right, title and interest in and to the said invention, for the whole world, and in and to the Letters Patent to be issued for the same in the United States and all other countries:

NOW, THEREFORE, To All Whom It May Concern: Be it known that for and in consideration of the sum of One ($1.00) Dollar to me in hand paid, by the said THOMSON ELECTRIC WELDING COMPANY, and other good and valuable consideration, the receipt of which is hereby acknowledged, I, the said ADLPH

F. RIETZEL, have sold, assigned, transferred and set over, and by these presents, do sell, assign, transfer and set over unto the said THOMSON ELECTRIC WELDING COMPANY, its successors and assigns, the entire right, title and interest in and to the invention and application for patent in and for the United States, and all other countries, the said invention and the Letters Patent to be issued for the same, together with any reissue or reissues or extension or extensions of said Letters Patent to be held and enjoyed by the said THOMSON ELECTRIC WELDING COMPANY, its successors, assigns or other legal representatives, for its own use and behoof, and for the use and behoof of its successors, assigns or other legal representatives, to the end of the term or terms for which said Letters Patent are or may be granted, reissued or extended, as fully and entirely as the same would have been held and enjoyed by me had this assignment and sale not been made. And I do hereby authorize and request the Commissioner of Patents of the United States to issue the Letters Patent for said invention to the said Company as the sole owner thereof.

And I do hereby further authorize the said THOMSON ELECTRIC WELDING COMPANY to apply for and obtain patents in its own name in all other countries, and to sign for me and in my name whenever it may be necessary, all papers requisite for applying for and obtaining Letters Patent in any foreign countries.

And I do further covenant and agree that I will execute such further application papers, powers of attorney or other instruments in writing as may be necessary to enable said Company to obtain foreign Letters Patent either in my or in its own name, or to vest in said Company the entire right, title and interest in said invention and any Letters Patent therefor.

And I do hereby covenant that I have full right to convey the entire interest herein assigned, and that I have not executed, and will not execute, any agreement in conflict therewith.

And I further hereby covenant and agree that I will, at any time, upon request, execute and deliver any and all papers that may be necessary or desirable to perfect the title to said invention or Letters Patent of the

United States, in said THOMSON ELECTRIC WELDING COMPANY, its successors, assigns or other legal representatives, and that if said THOMSON ELECTRIC WELDING COMPANY, its successors, assigns, or other legal representatives, desire to secure a reissue or extension of such Letters Patent, or that a disclaimer relating thereto should be filed, that I will, upon request, sign all papers, make all rightful oaths, and do all lawful acts requisite for the application for such reissue or extension and the procuring thereof and for the filing of such disclaimer, without further compensation, but at the expense of said assignee, its successors, assigns or other legal representatives.

And I do further covenant and agree that I will, at any time, upon request, communicate to said THOMSON ELECTRIC WELDING COMPANY, its successors, assigns, or other legal representatives, any facts relating to said invention and Letters Patent, or the history thereof, known to me, and testify as to the same in any interference of other litigation when requested to do so. while employed by said Thomson Electric Welding Co

written before being signed IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my seal at Lynn Mass. this 23rd day of March 1905.

In the presence of:
C. I. Limsey
Geo. W.N.Chadwell.

Adolph F. Rietzel. . . . .

County of Essex)
) SS
State of Mass.)

On this 23rd day of March in the year of our Lord, one thousand nine hundred and five, before me personally appeared Adolph F. Rietzel, to be personally known, and known to me to be the individual described in and who executed the foregoing assignment, and who acknowledged to me that he executed the same for the purpose therein set forth.

Wm. H. Bates
Notary Public.

William H. Bates,
Notary Public.
Commonwealth of
Massachusetts,
U.S.A.

Recorded June 22, 1905.

Defendant's Exhibit No. 38.

1956

2—391

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of an instrument of writing

Recorded July 19, 1910,

in

Liber S-84, pages 292 and 294.

Said record has been carefully compared with the original and is a correct transcript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 10th day of May, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

J. T. NEWTON,
(Seal) *Commissioner of Patents.*

S84—292.

WHEREAS on March 8, 1910 the stockholders of the Thomson Electric Welding Company, a corporation organized under the laws of the State of Maine, voted to sell and transfer all its assets and property, both real and personal, of every nature to the Thomson Electric Welding Company, a corporation organized under the laws of the Commonwealth of Massachusetts, a copy of which vote is hereto annexed; and

WHEREAS all the acts and things required to be done before such transfer have been done;

NOW, THEREFORE, the said Thomson Electric Welding Company of Maine in consideration of the premises and of one dollar and other valuable consideration to it paid by said Thomson Electric Welding Company of Massachusetts, the receipt whereof is hereby acknowledged, does hereby give, grant, bargain, sell, transfer, assign and convey unto the said Thomson Electric Welding Company of Massachusetts, all its property, both real and personal, and all its assets both tangible and intangible of every nature and wherever situated.

TO HAVE AND TO HOLD the same to the said Thomson Electric Welding Company of Massachusetts and its successors and assigns, to their own use and behoof forever.

And the said Thomson Electric Welding Company of Maine, does hereby constitute and appoint said Thomson Electric Welding

Company of Massachusetts its true and lawful attorney in the name and behalf of said Thomson Electric Welding Company of Maine, but to the use of said Thomson Electric Welding Company of Massachusetts to sign, seal, execute, acknowledge and deliver any and all instruments in writing necessary or convenient for the more effectual carrying out of the purposes and terms of this conveyance and transfer. It is understood and agreed, and is a part of the consideration of this conveyance, that said Thomson Electric Welding Company of Massachusetts shall assume and pay all legal debts and obligations of said Thomson Electric Welding Company of Maine now existing, and shall hold said Thomson Electric Welding Company of Maine harmless therefrom.

IN WITNESS WHEREOF the said Thomson Electric Welding Company of Maine has caused its corporate seal to be hereto affixed and this instrument to be executed, acknowledged and delivered in its name and behalf by Benjamin F. Spinney, its President, and William H. Hodges, its Treasurer, hereunto duly authorized, this eleventh day of March A. D. 1910.

THOMSON ELECTRIC
WELDING COMPANY
INCORPORATED 1888
THOMSON ELECTRIC WELDING COMPANY OF MAINE
By BENJAMIN F. SPINNEY, *President.*
W. H. HODGES, *Treasurer.*

COMMONWEALTH OF MASSACHUSETTS,

March 1910.

Essex, ss.

Then personally appeared the above named Benjamin F. Spinney and William H. Hodges, and acknowledged the foregoing instrument to be the free act and deed of the Thomson Electric Welding Company, before me,—

SAMUEL H. HOLLIS,
Justice of the Peace.

Salem, Mar 16 1910 at 10 o'clock and 20 minutes a. m. Received and Entered with Essex Deeds, So. Dist. Libro 2007 Page 291
Attest:

WILLARD J. HALL, *Register.*
Recorded July 19, 1910.

STATE OF MAINE.

Portland, March 8th, 1910.

Cumberland, ss.

THIS IS TO CERTIFY that at a legal meeting of the stockholders of THOMSON ELECTRIC WELDING COMPANY, duly called and held at the office of the Company, to wit, at the

office of Ardon W. Coombs, No. 85 Exchange Street, in said Portland, on this eighth day of March, A. D. 1910, the following vote was unanimously passed, viz:

"On motion, duly seconded, it was unanimously

VOTED: That this Company sell, transfer and convey all its assets to a corporation to be formed under the laws of Massachusetts to be called the THOMSON ELECTRIC WELDING COMPANY, and receive in exchange for said assets all the stock in said corporation, and that the president and treasurer of this corporation be authorized and directed to execute all deeds, conveyances and instruments necessary to carry such sale and transfer into effect.

A true certificate.

Attest:

CHARLES H. COLMAN,
Clerk of Thomas Electric Welding Co.

Recorded July 19, 1910.

Endorsement: Essex Reg. of Deeds,
So. District RECEIVED FOR RECORD
10.20 Mar 16 1910 BOOK 2007
Page 291.

1959

Defendant's Exhibit No. 39.

2—391

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of an instrument of writing

Recorded April 27, 1910,

in

Liber J-84, page 112.

Said record has been carefully compared with the original and is a correct transcript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 10th day of May, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

J. T. NEWTON,
Commissioner of Patents.

(Seal)

J 84-112

ASSIGNMENT.

WHEREAS, the THOMSON ELECTRIC WELDING COMPANY, a corporation duly organized and existing under the laws of the State of Maine and having an office at Lynn, Massachusetts, did, by virtue of certain assignments duly executed and delivered and recorded in the United States Patent Office, acquire the entire right, title and interest in and to certain inventions set forth in Letters Patent of the United States and in and to the Letters Patent issued upon the same, said Letters Patent being entitled, numbered and dated as follows:

Apparatus for Electric Welding	347,140	Aug.	10, 1886
Apparatus for Electric Welding	347,141	Aug.	10, 1886
Electric Welding	347,142	Aug.	10, 1886
Method of Electric Welding	375,022	Dec.	20, 1887
Apparatus for Electric Welding	375,784	Jan.	3, 1888
Electric Welding	385,022	June	26, 1888
Method of Joining Pipes by Electricity	385,384	July	3, 1888
Method of Electrically Welding			

Chains and Links	385,385	July	3, 1888
Direct Electric Welding Machines.	385,386	July	3, 1888
Apparatus for Electric Welding	386,441	July	17, 1888
Direct Welding Dynamo Electric Machines	389,779	Sept.	18, 1888
Collectors	394,797	Dec.	18, 1888
Portable Electric Welding Apparatus	394,892	Dec.	18, 1888
Forming, Brazing & Welding of Metals by Electricity	396,009	Jan.	8, 1889
Method of Electric Forging	396,010	Jan.	8, 1889
Method of Electric Welding	396,011	Jan.	8, 1889
Apparatus for Electric Welding & Working Metals	396,012	Jan.	8, 1889
Electric Pipe-Joining and Pipe-Work	396,013	Jan.	8, 1889
Electric Metal Working	396,014	Jan.	8, 1889
Method of Electric Riveting	396,015	Jan.	8, 1889
Method of Mfg. Screws & Bolts by Electricity	398,912	March	5, 1889
Electric Welding Machines	398,913	March	5, 1889
Electric Metal Working & Welding Machines	398,914	March	5, 1889
Method of Electric Welding & Shaping of Metals	403,157	May	14, 1889
Electrical Converter	403,541	May	21, 1889
Imp't in Electric Soldering, Brazing and Welding	403,707	May	21, 1889
Method of Electric Welding & Brazing	403,708	May	21, 1889
Compound-Wound Alternating Current Dynamo	405,263	June	18, 1889
—1—			
Electric Welding Clamp	415,305	Nov.	19, 1889
Method of Making Collars on Axles by Electricity	418,198	Dec.	31, 1889
Self-Oiling Box or Journal	421,991	Feb.	25, 1890
Method of Electric Soldering,&c.	423,966	March	25, 1890
Apparatus for Electric Soldering &c.	423,967	March	25, 1890
Burr-Remover	423,979	March	25, 1890
Projectiles	424,441	March	25, 1890
Projectiles	424,442	March	25, 1890
Sliding Clamps for Welding Apparatus	428,616	May	27, 1890
Electrical Apparatus for Welding Rings	428,617	May	27, 1890
Transformer for Heavy Currents	428,618	May	27, 1890
Method of Welding Rings	428,619	May	27, 1890

Reactive Coils	428,620	May	27, 1890
Electric Metal Working Apparatus.	432,629	July	22, 1890
Forming & Shaping Metals by Electricity	432,630	July	22, 1890
Method of Working Metals by Electricity	432,651	July	22, 1890
Welding or Other Dynamos	432,652	July	22, 1890
Method of Welding Pipes by Electricity	432,653	July	22, 1890
Mfg. of Bands, Rings, &c. by Electricity	432,656	July	22, 1890
Electric Welding Clamp	434,450	Aug.	19, 1890
Method of Electric Welding	434,468	Aug.	19, 1890
Process of Forming & Welding Metals by Electricity	434,530	Aug.	19, 1890
Induction Discharge Protector	434,531	Aug.	19, 1890
Process of Electric Welding	434,532	Aug.	19, 1890
Process of Electric Welding	438,657	Oct.	21, 1890
Electric Welding of Pipes	438,658	Oct.	21, 1890
Electric Welding Apparatus	440,640	Nov.	18, 1890
Electric Welding Apparatus	440,641	Nov.	18, 1890
Method of Electric Welding	440,664	Nov.	18, 1890
Burr-Remover	440,682	Nov.	18, 1890
Pneumatic Tool	443,029	Dec.	16, 1890
Pneumatic Tool	443,030	Dec.	16, 1890
Electric Welding Apparatus	443,224	Dec.	23, 1890
Method of Electric Welding	444,926	Jan.	20, 1891
Method of Electric Welding	444,927	Jan.	20, 1891
Method of Electric Welding	444,928	Jan.	20, 1891
Alternating Current Dynamo	444,939	Jan.	20, 1891
Welding & Working Metals	444,946	Jan.	20, 1891
Method of Electric Welding	446,974	Feb.	24, 1891
Mfg. of Chains by Electricity	449,356	March	31, 1891
Burr Preventors for Welding Machines	449,357	March	31, 1891
Method of Electric Welding	449,836	April	7, 1891
Method of Electric Welding	451,345	April	28, 1891
Metallic Wheel	452,840	May	26, 1891
Metallic Wheel	452,841	May	26, 1891
Method of Electric Welding	455,420	July	7, 1891
Securing Metal Bands on Wooden or other Articles	455,421	July	7, 1891
Automatic Hammers	455,905	July	14, 1891
Art of Electric Welding	458,176	Aug.	25, 1891
Adjustable Electric Clamp	458,177	Aug.	25, 1891
Method of Electric Bending and Straightening	458,115	Aug.	18, 1891
Electric Clamp	458,188	Aug.	25, 1891
Mode of Making Tools	461,856	Oct.	27, 1891

Automatic Electric Welding Machine	462,261	Nov.	3, 1891
—2—			
Laminated Die, Hammer, &c. for Electric Metal Working App.	462,262	Nov.	3, 1891
Method of and Apparatus for Constructing Electric Light or other Lines	462,263	Nov.	3, 1891
Sliding Clamps for Electric Welding Apparatus	465,866	Dec.	29, 1891
Process of Electric Metal-Working.	467,233	Jan.	19, 1892
Electrically Welding Metals	471,242	Mar.	22, 1892
Induction Discharge Protectors for Welding Apparatus	473,514	Apr.	26, 1892
Manufacture of Axes	476,967	June	14, 1892
Compound-Wound Alternating Current Dynamos	479,170	July	19, 1892
Method of Electric Soldering	480,392	Aug.	9, 1892
Method of Electric Welding	487,302	Dec.	6, 1892
Electric Soldering	496,019	Apr.	25, 1893
Automatic Chain Welding Machines.	501,546	July	18, 1893
Shaping & Spinning Metals by Electricity	501,547	July	18, 1893
Electric Furnace	513,602	Jan.	30, 1894
Electric Welding Apparatus	504,496	Sept.	5, 1893
Method of and Apparatus for Regulating Alternating Current Dynamos	504,497	Sept.	5, 1893
Chain Making Machines	512,848	Jan.	16, 1894
Mechanical Hammer	513,516	Jan.	30, 1894
Electric Metal-Working	515,778	Mar.	6, 1894
Process of Electric Metal-Working.	516,312	Mar.	13, 1894
Reactive Coils	519,335	May	8, 1894
Electric Welding Machines	519,336	May	8, 1894
Process of Electric Metal-Working.	523,986	Aug.	7, 1894
Electric Welding Machines	523,987	Aug.	7, 1894
Methods of Producing Locally Annealed Steel Plates	531,197	Dec.	18, 1894
Armatures for Dynamo Electric Machines or Motors	532,795	Jan.	22, 1895
Electric Welding Apparatus	532,838	Jan.	22, 1895
Electric Metal Working Apparatus	534,802	Feb.	26, 1895
Apparatus for Electric Welding	553,923	Feb.	4, 1896
Electric Welding Indicators	555,130	Feb.	25, 1896
Electric Riveting	555,131	Feb.	25, 1896
Electric Hub Welding Machines	556,414	Mar.	17, 1896
Electric Registering Instruments	556,425	Mar.	17, 1896
Electric Metal Working Apparatus	556,426	Mar.	17, 1896
Electric Metal Working Apparatus	564,331	July	21, 1896

Electric Metal Working Apparatus	564,792	July	28, 1896
Chains	568,531	Sept.	29, 1896
Electric Riveting Apparatus	580,475	Apr.	13, 1897
Combination Cast & Flexible Secondary	649,179	May	8, 1900
Hoop Welder	661,588	Nov.	13, 1900
Double Transformer Welder	661,589	Nov.	13, 1900
Electric Welding Apparatus	666,157	Jan.	15, 1901
Transformers for Welding	666,161	Jan.	15, 1901
Transforming Apparatus for Electric Metal Working	666,162	Jan.	15, 1901
Apparatus for the Manufacture of Tubes, Pipes, &c.	686,558	Nov.	12, 1901
Clamp Device for Electric Welding Machines	719,508	Feb.	3, 1903
Clamping Device for Electric Metal Working Apparatus	735,821	Aug.	11, 1903
Electric Welding Clamping Device	766,288	Aug.	2, 1904
Process of Electric Welding	778,269	Dec.	27, 1904
Electric Chain Welding Machine	783,543	Feb.	28, 1905
Transformer	783,651	Feb.	28, 1905

Electric Welding Machine	785,379	Mar.	21, 1905
Electric Welding Clamping Device	804,045	Nov.	7, 1905
Automatic Electric Metal Working Machine	821,061	May	22, 1906
Method of Making a Joint in Thin Flat Material	870,847	Nov.	12, 1907
Uniting the Component Parts of Composite Sheet Metal Structures	928,701	July	20, 1909
Clamp for Electric Welding Machine	853,579	Mar.	29, 1910;

and

WHEREAS, the THOMSON ELECTRIC WELDING COMPANY of the State of Maine did, by virtue of certain assignments duly executed and delivered and recorded in the United States Patent Office, also acquire the entire right, title and interest in and to certain inventions set forth in certain applications for Letters Patent of the United States, and in and to the Letters Patent to be issued on the same, for the whole world, said applications being entitled, numbered and dated as follows:

Automatic Electric Welding Machine, Serial No. 284,317, Filed Oct. 25, 1905, A. F. Rietzel, inventor,

Method of Forming a Joint in Metal, Serial No. 337,137, Filed Oct. 2, 1905, A. F. Rietzel, inventor,

Method of Joining Metal, Serial No. 337,136

Machine for Electrically Welding Attachments to Sheet Metal Utensils, Serial No. 342,456, Filed Nov. 8, 1906, A. F. Rietzel, inventor,

Construction of Sheet Metal Utensils, Serial No. 349,547,
Filed Dec. 26, 1906, A. F. Rietzel, inventor,
Electric Chain Welding Machine Serial No. 373,081,
Filed May 11, 1907, A. F. Rietzel and George
E. Barstow, inventors,
Composite Sheet Metal Work, Serial No. 426,959,
Filed Apr. 14, 1908, A. F. Rietzel, inventor,
Method of Electrically Welding Chain Links, S. N. 437,594,
Filed June 9, 1908, W. H. Hodges, inventor,
Contact for Electric Welding Machines, S. No. 450,140,
Filed Aug. 25, 1908, A. F. Rietzel, inventor,
Electric Metal Working Apparatus, Serial No. 463,536,
Filed Nov. 20, 1908, A. F. Rietzel and George
E. Barstow, inventors,

— 4 —

Electric Metal Working Apparatus Serial No. 469,189,
Filed Dec. 26, 1908, A. F. Rietzel and George
E. Barstow, inventors,
Electric Metal Working Apparatus, Serial No. 495,601,
Filed May 13, 1909, A. F. Rietzel, inventor,
Method of Electric Welding, Serial No. 506,881,
Filed July 10, 1909, Elihu Thomson, inventor,
Electric Metal Working Apparatus, Serial No. 506,963,
Filed July 10, 1909, A. F. Rietzel, inventor,
Transformer Secondary, Serial No. 511,279,
Filed Aug. 5, 1909, Elihu Thomson, inventor,
Electric Welding of Sheet Metal, Serial No. 523,765,
Filed Oct. 21, 1909, Elihu Thomson, inventor,
Electric Welding of Sheet Metal, Serial No. 523,766,
Filed Oct. 21, 1909, Elihu Thomson, inventor;

and

WHEREAS, the THOMSON ELECTRIC WELDING COMPANY, a corporation duly organized and existing under the laws of the State of Massachusetts and having an office at Lynn, in the said State, is desirous of acquiring the entire right, title and interest in and to the said inventions, Letters Patent, applications for patent and Letters Patent to be issued on the same in and for the United States and all other countries:

NOW, THEREFORE, To All Whom It May Concern:

Be it known that for and in consideration of the sum of One (1) Dollar to the THOMSON ELECTRIC WELDING COMPANY of Maine in hand paid by the THOMSON ELECTRIC WELDING COMPANY of Massachusetts and other good and valuable consideration, the receipt of which is hereby acknowledged, the said THOMSON ELECTRIC WELDING COMPANY of Maine has sold, assigned, transferred and set over and by these presents does sell, assign, transfer and set over unto the said THOMSON ELECTRIC WELDING COMPANY, of Massachusetts, its successors and assigns, the entire right, title and interest in and to the said in-

ventions, Letters Patent, applications for patent and Letters Patent to be issued for the same in

— 5 —

and for the United States and all other countries, together with the right, to be exercised in its own name and for its own use, to sue and recover for past infringement of said Letters Patent, the said inventions and Letters Patent issued and to be issued for the same, together with any reissue or reissues or extension or extensions of said Letters Patent, to be held and enjoyed by the said THOMSON ELECTRIC WELDING COMPANY of Massachusetts, its successors assigns, or other legal representatives, for its own use and behoof and for the use of its successors, assigns, or other legal representatives, to the end of the term or terms for which said Letters Patent are or may be granted, reissued or extended, as fully and entirely as the same would have been held and enjoyed by the said THOMSON ELECTRIC WELDING COMPANY of Maine, had this assignment and sale not been made.

And the said THOMSON ELECTRIC WELDING COMPANY of Maine hereby authorizes and requests the Commissioner of Patents to issue the Letters Patent for the inventions set forth in the above applications to the THOMSON ELECTRIC WELDING COMPANY of Massachusetts, as the sole owner thereof.

IN WITNESS WHEREOF the said THOMSON ELECTRIC WELDING COMPANY of Maine has caused its corporate seal to be hereto affixed and this instrument to be executed, acknowledged and delivered in its name and behalf this 18th day of April, 1910, by Benjamin F. Spinney, its President, and William H. Hodges, its Treasurer, hereunto duly authorized by the unanimous vote of the stockholders of said COMPANY, a copy of which vote is hereto annexed.

THOMSON ELECTRIC
WELDING COMPANY
INCORPORATED 1888
THOMSON ELECTRIC WELDING COMPANY OF MAINE
By Benjamin F. Spinney, President.
William H. Hodges, Treasurer.

— 6 —

COMMONWEALTH OF MASSACHUSETTS.

Essex, ss. April 18, 1910.

Then personally appeared the above named Benjamin F. Spinney and William H. Hodges, and acknowledged the foregoing instrument to be the free act and deed of the THOMSON ELECTRIC WELDING COMPANY of Maine, before me.

WILLIAM H. BATES,
NOTARY PUBLIC.
COMMONWEALTH OF
MASSACHUSETTS
U. S. A.

Wm. H. Bates
Notary Public.

—7—

State of Maine.

Cumberland, ss. Portland, March 8th, 1910.

THIS IS TO CERTIFY that at a legal meeting of the stockholders of THOMSON ELECTRIC WELDING COMPANY, duly called and held at the office of the Company, to wit, at the office of Ardon W. Coombs, No. 85 Exchange Street, in said Portland, on this eighth day of March, A. D. 1910, the following vote was unanimously passed, vis:

On motion, duly seconded, it was unanimously

VOTED: That this Company sell, transfer and convey all its assets to a corporation to be formed under the laws of Massachusetts to be called the THOMSON ELECTRIC WELDING COMPANY, and receive in exchange for said assets all the stock in said corporation, and that the president and treasurer of this corporation be authorized and directed to execute all deeds, conveyances and instruments necessary to carry such sale and transfer into effect."

A true certificate.

Attest:

Charles H. Tolman
Clerk of
Thomson Electric Welding Company.

County of CUMBERLAND)
ss:
State of MAINE.)

On this 18th day of April, 1910, before me personally appeared Charles H. Tolman, to me personally known and known to me to be the individual described in and who executed the foregoing, and who acknowledged to me that he executed the same for the purpose therein set forth.

ARDON W. COOMBS,
NOTARY PUBLIC
PORTLAND, MAINE.

Ardon W. Coombs,
Notary Public.

Recorded April 27, 1910.

Defendant's Exhibit No. 40 1967

No 39

2-391

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of an instrument of writing

Recorded February 19, 1917,

in

Liber N-102, page 36.

record has been carefully compared with the original and is a correct transcript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 22nd day of April in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Acting Commissioner of Patents.

1968
R 102-36

ASSIGNMENT

WHEREAS the THOMSON ELECTRIC WELDING COMPANY, a corporation duly organized and existing under the laws of the Commonwealth of Massachusetts, and, having an office in the City of Lynn, Massachusetts, did, by virtue of certain assignments duly executed and delivered and recorded in the United States Patent Office, acquire the entire right, title and interest in and to certain inventions set forth in Letters Patent of the United States and in and to the Letters Patent issued upon the same, said Letters Patent being entitled, numbered and dated as follows:

Uniting the Component Parts of Composite Sheet Metal Structures, No. 928,701, July 20, 1909;

Electric Welding of Sheet Metal No. 973,586, Oct. 25, 1910;

Sheave Welder, No. 985,838, Mar. 7, 1911;

Composite Sheet Metal, No. 1,020,056, Mar. 12, 1912;

Method of Joining Metal, No. 1,040,418, Oct. 8, 1912;

Electric Welding, No. 1,046,066, Dec. 3, 1912;

Electric Metal Working Apparatus, No. 1,074,383, Sept. 30, 1913;

Electrical Welding of Sheet Metal, No. 1,078,225, Nov. 11, 1913;

Electric Seam Welding, No. 1,083,956, Jan. 13, 1914;

Spot Welding Machine, No. 1,084,673, Jan. 20, 1914;

Spot Welding Thin Sheets, No. 1,085,769, Feb. 3, 1914;

Spot Welding, No. 1,097,895, May 26, 1914;

Spot Welding Machine, No. 1,122,665, Dec. 29, 1914;

Method of Electric Seam Welding, No. 1,123,624, Jan. 5, 1915

Electric Welding, No. 1,143,220, June 15, 1915;

Electric Metal Working Apparatus No. 1,174,446; Mar. 7, 1916; and

WHEREAS the said THOMSON ELECTRIC WELDING COMPANY, did by virtue of a certain assignment duly executed and delivered and recorded in the United States Patent Office, also acquire the entire right, title and interest in and to the invention relating to Combination Spot and Butt Welder set forth in a certain application for Letters Patent of the United States filed in the United States Patent Office on the 4th day of August, 1916, Serial Number 113,055; and

WHEREAS the THOMSON SPOT WELDER COMPANY, (formerly Electric Welder Company) a corporation duly organized and existing under the laws of the Commonwealth of Massachusetts and having an office in the City of Boston, State of Massachusetts is desirous of acquiring the entire right, title and interest in and to the said inventions, Letters Patent, application for patent and the Letters Patent to be issued on the same in and for the United States;

NOW THEREFORE, To All Whom It May Concern:

Be it known that for and in consideration of the sum of One Dollar ($1.00) to the THOMSON ELECTRIC WELDING COMPANY in hand paid by the THOMSON SPOT WELDER COMPANY and other good and valuable consideration, receipt of which is hereby

acknowledged, the said THOMSON ELECTRIC WELDING COMPANY has sold, assigned transferred and set over and by these presents does sell, assign

transfer and set over unto the said THOMSON SPOT WELDER COMPANY, its successors and assigns, the entire right, title and interest in and to the said inventions, Letters Patent, application for patent and Letters Patent to be issued for the same in and for the United States, together with any and all rights of action, claims and demands whatsoever of the said THOMSON ELECTRIC WELDING COMPANY either at law or in equity, for damages or profits or both, arising from past infringement of said Letters Patent, with the full right and power in its own name to sue for and collect the same for its own use and benefit, the said inventions and Letters Patent issued and to be issued for the same, together with any reissue or reissues or extension or extensions of said Letters Patent, to be held and enjoyed by the said THOMSON SPOT WELDER COMPANY, its successors, assigns or other legal representatives, for its own use and benefit and for the use of its successors, assigns or other legal representatives, to the end of the term or terms for which said Letters Patent are or may be granted, reissued or extended as fully and entirely as the same would have been held and enjoyed by the THOMSON ELECTRIC WELDING COMPANY had this assignment and sale not been made.

And the said THOMSON ELECTRIC WELDING COMPANY, hereby authorizes and requests the Commissioner of Patents to issue the Letters Patent for the invention set forth in the above application to the THOMSON SPOT WELDER COMPANY as the sole owner thereof.

IN WITNESS WHEREOF the said THOMSON ELECTRIC WELDING COMPANY has set its hand and seal this 14th day of February, 1917

THOMSON ELECTRIC
WELDING COMPANY
INCORPORATED 1910
MASSACHUSETTS.

Thomson Electric Welding Company
By J W Farley
President.

COMMONWEALTH OF MASSACHUSETTS }
SUFFOLK, ss. }

Boston, Mass., February 14, 1917.

Then personally appeared J.W. Farley, the President of the above-named THOMSON ELECTRIC WELDING COMPANY and acknowledged the foregoing instrument to be the free act and deed of said Company.

DANIEL J LYNE
NOTARY PUBLIC
MASSACHUSETTS

Daniel J Lyne
Notary Public.

Recorded February 19,1917.

Defendant's Exhibit No. 41 1971

No 40

9—891

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of an instrument of writing

Recorded July 3, 1917,

in

Liber A-103, page 23.

Said record has been carefully compared with the original and is a correct transcript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 24th day of March in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Acting Commissioner of Patents.

1972

a 103-23

UNITED STATES,

ASSIGNMENT.

WHEREAS I, SEBASTIAN ZIANI de FERRANTI, formerly of Grindleford Bridge, Sheffield in the County of Derby, England, but now of Hollinwood, Lancaster, England, have invented certain new and useful ELECTRIC WELDING for which I have made application for Letters Patent of the United States under Serial Number 668464 which application was filed on the 29th day of December 1911 AND WHEREAS FRANK L. MIDDLETON of Victor Building, 9th & Grant Place, Washington, D. C., United States of America, is desirous of acquiring an interest in said Invention and in the Letters Patent to be obtained therefor:

NOW THEREFORE, TO ALL WHOM IT MAY CONCERN, BE IT KNOWN THAT, for and in consideration of the sum of ONE DOLLAR to me in hand paid, the receipt of which is hereby acknowledged, I the said SEBASTIAN ZIANI de FERRANTI have sold, assigned and transferred, and by these presents do sell assign and transfer unto the said FRANK L. MIDDLETON, the full and exclusive right to the said invention as fully set forth and described in the specification prepared and executed by me preparatory to obtaining Letters Patent of the United States therefor; and I do hereby authorise and request the Commissioner of Patents to issue the said Letters Patent to the said FRANK L. MIDDLETON as the Assignee of my entire right title and interest in and to the same for the sole use and behoof of the said FRANK L. MIDDLETON and his legal representatives.

IN TESTIMONY WHEREOF I have hereunto affixed my hand and seal this 8th day of June, 1917.

IN PRESENCE OF:
Ernald Simpson Moseley
Maud Shatwell;

Sebastian Ziani de Ferranti SEAL

(over)

1973

Certificate of Acknowledgment of Execution of Document.

United Kingdom of Great Britain and Ireland,

Lancaster, ss:

City of Manchester,

I, Ross E. Holaday, Consul, of the United States of America at Manchester, England, duly commissioned and qualified, do hereby certify that on this 8th day of June, 1917, before me personally appeared Sebastian Ziani de Ferranti, to me personally known, and known to me to be the individual described in, whose name is subscribed to, and who executed the annexed instrument, and being informed by me of the contents of said instrument he duly acknowledged to me that he executed the same freely and voluntarily for the uses and purposes therein mentioned.

CONSULATE OF THE UNITED STATES E PLURIBUS UNUM MANCHESTER, ENGLAND

In witness whereof I have hereunto set my hand and official seal the day and year last above written.

AMERICAN CONSULAR SERVICE FEE STAMP $2 0056

R. E. Holaday
Consul of the United States of America.

Fee No. 33, Two Dollars.

Recorded July 3, 1917.

47

Defendant's Exhibit No. 42

1974

No 41

2—891

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of an instrument of writing

Recorded July 3, 1917,

in

Liber A-103, page 24.

Said record has been carefully compared with the original and is a correct transcript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 24th day of March, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Acting Commissioner of Patents.

1975

- A S S I G N M E N T -

WHEREAS, SEBASTIAN Z. de FERRANTI, of Grindleford Bridge, Sheffield, England, is the inventor of certain new and useful Improvements in Electric Welding, which invention is set forth and described in an application for Letters Patent of the United States, filed by said de Ferranti in the United States Patent Office on the 29th day of December, 1911, and known and designated as application Serial No. 668,464; and

WHEREAS, I, FRANK L. MIDDLETON, of Washington, D. C., am the owner by assignment of the said invention and application, and of all rights in, to and under the same; and

WHEREAS, MELVILLE CHURCH, of Washington, D. C., is desirous of acquiring the ownership of said invention and application, and of all rights in, to and under the same:

NOW, THEREFORE, in consideration of the sum of One Dollar ($1.00) to me in hand paid by the said Melville Church, and of other good and valuable considerations from the said Church to me moving, the receipt of which is hereby acknowledged, I, Frank L. Middleton, do hereby sell, assign and transfer unto the said Melville Church, his heirs and assigns, the said invention, together with

said application and any patent or patents that may be issued on the same, the same to be held and enjoyed by the said Melville Church, his heirs and assigns, as fully and entirely as the same would have been held and enjoyed by me had this assignment and sale not been made.

AND I hereby authorize and request the Commissioner of Patents to issue any Letters Patent that may be granted for said invention to the said Melville Church, his heirs and assigns, in accordance with this assignment.

AND I hereby covenant and agree with the said Melville Church, his heirs and assigns, that I am the owner of the entire right, title and interest in and to the said invention and application, and that I have a good right to sell and convey the same; and I agree to execute any further assurances of title that may be necessary to convey said invention and application to the said Melville Church, his heirs and assigns.

Signed at Washington, D. C., this 2nd day of July, 1917.

Frank L. Middleton

DISTRICT OF COLUMBIA : ss.

On this 2nd day of July, 1917, personally appeared before me, a notary public in and for the District of Columbia, FRANK L. MIDDLETON, to me known and known to me to be the party who executed the foregoing assignment and who acknowledged that he executed the same.

THOMAS DURANT. NOTARY PUBLIC DISTRICT OF COLUMBIA.

Thomas Durant
Notary Public.

Recorded July 3, 1917.

Defendant's Exhibit No. 43 1977

No 42

2—891

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of an instrument of writing

Recorded August 8, 1917,

in

Liber D-103, page 157.

[illegible] record has been carefully compared with the original and is a correct [illegible]cript of the whole thereof.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 24th day of March in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-third.

Acting Commissioner of Patents.

1978

-A S S I G N M E N T-

WHEREAS, SEBASTIAN Z. de FERRANTI, of Grindleford Bridge, Sheffield, England is the inventor of certain new and useful Improvements in Electric Welding, which invention is set forth and described in an application for Letters Patent of the United States, filed by said de Ferranti in the United States Patent Office on the 20th day of December, 1911, and known and designated as application Serial No. 668,464; and

WHEREAS, I, MELVILLE CHURCH, of WASHINGTON, D.C., am the owner by assignment of the said invention and application, and of all rights in, to and under the same; and

WHEREAS, HENRY C. MILLIGAN, TRUSTEE, of Canton, Ohio, is desirous of acquiring the ownership of said invention and application, and of all rights in, to and under the same;

NOW, THEREFORE, in consideration of the sum of One Dollar ($1.00) to me in hand paid by the said Henry C. Milligan, Trustee, and of other good and valuable

considerations from the said Henry C.Milligan,Trustee,to me moving, the receipt of which is hereby acknowledged, I, Melville Church, do hereby sell,assign and transfer unto the said Henry C. Milligan,Trustee, his heirs and assigns, the said invention,together with said application and any patent or patents that may be issued on the same, the same to be held and enjoyed by the said Henry C. Milligan,Trustee, his heirs and assigns, as fully and entirely as the same would have been held and enjoyed by me had this assignment and sale not been made.

AND I hereby authorize and request the Commissioner of Patents to issue any Letters Patent that may be granted for said invention to the said HENRY C. MILLIGAN,TRUSTEE, his heirs and assigns, in accordance with this assignment.

AND I hereby covenant and agree with the said Henry C.Milligan,Trustee, his heirs and assigns, that I am the owner of the entire right,title and interest in and to the said invention and application, and that I have a good right to sell and convey the same; and I agree to execute any further assurances of title that may be necessary to convey said invention and application to the said Henry C.Milligan,Trustee,his heirs and assigns.

Signed at Washington,D .C., this 26th day of July,1917.

Melville Church

DISTRICT OF COLUMBIA: ss.

On this 26th day of July,1917, personally appeared before me, a notary public in and for the District of Columbia, MELVILLE CHURCH, to me known and known to me to be the party who executed the foregoing assignment and who acknowledged that he executed the same.

THOMAS DURANT,
NOTARY PUBLIC

Thomas Durant
Notary Public

DISTRICT OF COLUMBIA.

Recorded August 8,1917.

Defendant's Exhibit No. 44.

WHEREAS, SEBASTIAN Z. de FERRANTI, of Grindleford Bridge, Sheffield, England, is the inventor of certain new and useful improvements in ELECTRIC WELDING, which invention is set forth and described in an application for Letters Patent of the United States, filed by said de FERRANTI in the United States Patent Office on the 29th day of December, 1911, Serial No. 668,464, said application being a division of an application for Letters Patent of the United States filed by said de FERRANTI in the United States Patent Office May 14th, 1904, Serial No. 208,034; and

WHEREAS, said de FERRANTI'S application Serial No. 668,464 is at present involved in Interference No. 36,709 in the United States Patent Office with Letters Patent of the United States for Electric Welding, No. 1,046,066, issued to Johann Harmatta December 3, 1912, and said de FERRANTI is entitled to priority of invention of the subject-matter of his said application under the provisions of the International Convention for the Protection of Industrial Property and of the Statutes of the United States as of May 25th, 1903, on which day he filed application for Letters Patent of Great Britain No. 11,921 of 1903 setting forth said invention; and

WHEREAS, HENRY C. MILLIGAN, TRUSTEE, of Canton, Ohio, is the owner by mesne assignments of said de FERRANTI application Serial No. 668,464, and of the invention therein set forth, and of the Letters Patent of the United States to issue thereon, and of all other rights in, to and under the same; and

WHEREAS, FORD MOTOR COMPANY, a corporation organized and existing under the laws of the State of Michigan, is desirous of acquiring a license under and interest in said de FERRANTI invention and application, and in, to and under any Letters Patent of the United States which may be granted therefor;

NOW, THEREFORE, in consideration of one dollar to said HENRY C. MILLIGAN, TRUSTEE, in hand paid by said FORD MOTOR COMPANY, and of other good and valuable considerations from said COMPANY to said MILLIGAN, TRUSTEE, moving, the receipt of which is hereby acknowledged, said HENRY C. MILLIGAN, TRUSTEE, hereby gives and grants unto said FORD MOTOR COMPANY the right and license to use said invention, excepting for the manufacture of spinning machinery and turbines, under said application Serial No. 668,464, and under any Letters Patent of the United States which may be granted thereon, such right and license to relate back to, and to be deemed to be in full force and effect since May 25, 1903, the date of priority of invention to which said de FERRANTI is entitled, and to continue in force to the expiration of any Letters Patent of the United States which may be granted on said de FERRANTI application Serial No. 668,464, meaning and intending hereby to confer upon

said FORD MOTOR COMPANY a right and license under said invention, application and Letters Patent to issue thereon, and right of priority thereunder coextensive in time with that enjoyed by said de FERRANTI and those deriving title or interest from and under him.

SIGNED, sealed and delivered at Canton, Ohio, this 30th day of November, 1917.

HENRY C. MILLIGAN,
Trustee.

1982

Defendant's Exhibit No. 45.

DISTRICT COURT OF THE UNITED STATES.

DISTRICT OF MASSACHUSETTS.

IN EQUITY.

THOMSON ELECTRIC WELDING COMPANY AND UNIVERSAL ELECTRIC WELDING COMPANY

vs.

BARNEY & BERRY, INC.

INTERLOCUTORY DECREE.

July 17, 1916.

DODGE, J. This cause came on to be further heard upon the pleadings and proofs and upon the Mandate of the Circuit Court of Appeals for the First Circuit, and counsel for the respective parties having been heard, now, upon consideration thereof it is hereby ordered, adjudged and decreed that the Letters Patent of the United States referred to in the complainant's bill granted to the Thomson Electric Welding Company, as assignee of Johann Harmatta, No. 1,046,066, dated December 3, 1912, are good and valid; that said Johann Harmatta was the original and first inventor of the improvements described in said Letters Patent; that the complainant, the Thomson Electric Welding Company, is the true and lawful owner of said Letters Patent; that the complainant, the Universal Electric Welding Company, is a licensee under said Letters Patent; and that the defendant, Barney & Berry, Inc., has infringed claims 3, 4, 5, 6, 8, 9, 11, 12 17, 18 19 and 21 of said Letters Patent and upon the exclusive rights of the complainants under the same.

It is further ordered adjudged and decreed, that the complainants recover of the defendant the gains and profits which said defendant has derived, received or made by reason of its infringement of said claims of said Letters Patent, and that said complainants also recover any and all damages which they have sustained by reason of said infringement of said claims by the defendant; and this cause is hereby referred to
as a master of this court, to take and state an account of such gains and profits, and to assess such damages and to report thereon with all convenient speed. And the officers and employees of the defendant are hereby directed and required to attend before said master from time to time as required, and to produce before him such books, papers and documents as relate to the matters at issue, and to submit to such oral examination as the master may require.

It is further ordered, adjudged and decreed, that a perpetual in-

junction be issued out of and under the seal of this court against the said defendant, Barney & Berry, Inc., strictly enjoining and restraining it, its clerks, attorneys, agents, servants and workmen from directly or indirectly infringing said Letters Patent, and from practising the process of electric welding containing or embodying the invention described and patented in said Letters Patent and referred to in the claims thereof numbered 3, 4, 5, 6, 8, 9, 11 and 12, and from directly or indirectly making, constructing, using or selling metal articles containing or embodying the invention described and patented in said Letters Patent, and referred to in the claims thereof numbered 17, 18, 19 and 21.

It is further ordered, adjudged and decreed, that the complainants recover of the defendant their costs of suit to be taxed.

By the Court.

JOHN E. GILMAN, JR.,
Deputy Clerk.

F.D.

ENDORSED.

701 Eq.

DISTRICT COURT OF THE UNITED STATES.

DISTRICT OF MASSACHUSETTS.

IN EQUITY.

THOMSON ELECTRIC WELDING COMPANY AND UNIVERSAL ELECTRIC WELDING COMPANY

vs.

BARNEY & BERRY, INC.

INTERLOCUTORY DECREE.

July 17, 1916.

701 Eq.

INTERLOCUTORY DECREE.

U. S. DISTRICT COURT,
MASS. DIST.
FILED IN CLERK'S OFFICE
Jul 17 1916

From the office of

Fish, Richardson, Herrick & Neave,

84 State Street,

Boston, Mass.

Defendant's Exhibit No. 45.

DISTRICT COURT OF THE UNITED STATES.

DISTRICT OF MASSACHUSETTS.

I, JAMES S. ALLEN, Clerk of said Court, hereby certify that the foregoing is a true copy of the Interlocutory Decree entered July 17, 1916, in the case entitled:

No. 701 Equity,

THOMSON ELECTRIC WELDING COMPANY ET AL.,

vs.

BARNEY & BERRY, INC.

now pending in said District Court.

IN TESTIMONY WHEREOF I have hereunto set my hand and affixed the seal of said Court at Boston, in (Seal) said District, this eleventh day of March, A. D., 1919.

JAMES S. ALLEN,
Clerk.

Defendant's Exhibit No. 46.

CIRCUIT COURT OF THE UNITED STATES, FOR THE SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, PLAINTIFFS,

vs.

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

IN EQUITY.

JOHN A SHIELDS,
Clerk Circuit Court U. S. Southern District of N. Y.

You will please issue a Subpoena to the defendant in the above-entitled action, returnable on the first Monday of January, 1911.

HENRY C. TOWNSEND,
Solicitor for Complainant.

New York, Nov. 17, 1910.

(Endorsed) U. S. Circuit Court, Southern District New York, Filed Nov. 17, 1910, John A. Shields, Clerk.

THE PRESIDENT OF THE UNITED STATES OF AMERICA
To
NATIONAL ENAMELING & STAMPING COMPANY, GREETING:

YOU ARE HEREBY COMMANDED that you personally appear before the Judges of the Circuit Court of the United States of America, for the Southern District of New York, in the Second Circuit, in Equity, on the first Monday of January, A. D. 1911 wherever the said Court shall then be, to answer a bill of complaint exhibited against you in the said Court by THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, and do further and receive what the said Court shall have considered in that behalf. And this you are not to omit under the penalty on you of Two Hundred and Fifty Dollars.

WITNESS, The Honorable JOHN M. HARLAN, Associate Justice of the Supreme Court of the United States, at the Borough of Manhattan, in the City of New York, on the 17th day of November, in the year of our Lord one thousand nine hundred and ten, and of the Independence of the United States of America, the one hundred and thirty-fifth.

JOHN A. SHIELDS, *Clerk.*

HENRY C. TOWNSEND,
Solicitor for Complainant,
149 Broadway.

The Defendant is required to enter appearance in the above cause, in the Clerk's Office of this Court, on or before the first Monday of January, 1911, or the bill will be taken *pro confesso* against it.

J. A. S., *Clerk.*

I HEREBY CERTIFY, That on the 17th day of November, 1910, at the City of New York, in my district, I served the within Subpoena in Equity upon the within-named Defendant National Enameling and Stamping Company by exhibiting to Adolph M. Steinhardt as Treasurer of said Company at No. 81 Fulton Street, N. Y. City, the within original, and at the same time leaving with him a copy thereof.

WM. HENKEL,
United States Marshal, Southern District of New York.

Dated Nov. 18th, 1910.

U. S. Circuit Court, Southern District N. Y., Filed Nov. 18, 1910, John A. Shields, Clerk.

IN THE CIRCUIT COURT OF THE UNITED STATES, FOR THE SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, PLAINTIFFS,

vs.

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

IN EQUITY.

BILL OF COMPLAINT.

TO THE HONORABLE JUDGES OF THE CIRCUIT COURT OF THE UNITED STATES FOR THE SOUTHERN DISTRICT OF NEW YORK:

1. The Thomson Electric Welding Company, a corporation duly organized and existing under the laws of the State of Massachusetts and having a principal place of business at Lynn, in the State of Massachusetts, and the Universal Electric Welding Company, a corporation duly organized and existing under the laws of the State of New York and having a principal place of business in the Borough of Queens, in the City of New York, State of New York, bring this, their bill of complaint, against the National Enameling & Stamping Company, a corporation organized and existing under the laws of the State of New Jersey, having a regular and established place of business, and having committed acts of infringe-

ment as hereinafter complained of, within the Southern District of New York, and thereupon your orators complain and say:

2. That, as your orators are informed and believe and accordingly aver, Adolph F. Rietzel, being a citizen of the United States and a resident of Lynn, in the County of Essex, and State of Massachusetts, was prior to the twenty-fourth day of February, nineteen hundred and five, the original and first inventor of certain new and useful improvements in Uniting the Component parts of Sheet Metal Structures, since commonly known in the art as Electric Spot or Point Welding, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof or more than two years prior to his hereinafter recited application for patent therefor, and not in public use or on sale in this country for more than two years before his said application for Letters Patent, and not patented or caused to be patented by him or his legal representatives or assigns in any foreign country upon any application for foreign patent filed more than one year prior to the filing of his hereinafter recited application for patent for said invention, and not abandoned prior to said application; and that, being said original and first inventor the said Adolph F. Rietzel on or before the twenty-fourth day of February, 1905, made application in due form of law to the Commissioner of Patents of the United States for Letters Patent for his said invention and duly swore to the specification thereof, and by valid assignment assigned to the Thomson Electric Welding Company a corporation duly organized under the laws of the State of Maine, his said application and invention therein set forth and any Letters Patent that might be granted for said invention, and requested the Commissioner of Patents to issue to said Thomson Electric Welding Company of Maine as his assignee any Letters Patent which might be granted on his said application; whereupon such proceedings were had that on the twentieth day of July, 1909, Letters Patent of the United States No. 929,701 were granted to the said Thomson Electric Welding Company of Maine in conformity with the requirements of the statutes in such case made and provided, which said Letters Patent in their terms granted to said Thomson Electric Welding Company of Maine, its successors and assigns, for the term of seventeen years from said last mentioned day, the exclusive right to make, use and vend the invention therein described and claimed, referring to the specifications for the particulars thereof, and your orators bring here into Court a duly authenticated copy of said Letters Patent and pray that the same may be taken as a part of this bill.

3. And your orators further show that the Thomson Electric Welding Company of Maine to whose rights your orator, the Thomson Electric Welding Company of Massachusetts succeeded, as hereinafter set forth, entered into certain agreements with your orator, the Universal Electric Welding Company, dated respectively

the 26th day of February, 1909, and the 20th day of July, 1909, which agreements ever since the issuance of said patent and up to the beginning of this action have been continuously in full force and effect, whereby your orator, the Universal Electric Welding Company, acquired the exclusive right to use the invention covered by the aforesaid Letters Patent in connection with machines built by said Thomson Electric Welding Company of Maine or with its permission, and leased to your orator, the Universal Electric Welding Company, upon a continuing fixed annual rental or royalty, to be paid to the said Thomson Electric Welding Company of Maine, its successors and assigns, together with the right to sublease and let said machines, subject to the conditions and covenants of said agreements, as in and by said agreements here in Court to be produced will more fully appear.

4. And your orators further show that by valid mesne assignments duly recorded in the office of the Commissioner of Patents of the United States, all the right, title and interest of said Thomson Electric Welding Company of Maine in and to said Letters Patent and in and to the invention secured thereby, including the right to sue for and recover all damages and profits that might be due to the Thomson Electric Welding Company of Maine for the infringement of the said Letters Patent prior to the aforesaid assignments, subject to the rights of your orator the Universal Electric Welding Company, as hereinbefore set forth, became vested in your orator the Thomson Electric Welding Company of Massachusetts, and your orator then became and ever since have been and now are the owners of said Letters Patent and as such entitled to and possessed of the full and exclusive right and liberty of making, constructing, using and vending to others to be used, the aforesaid invention within and throughout the United States and the Territories thereof, and entitled to collect and hold to their own use all damages and profits that are recoverable for past infringement of said Letters Patent since the date thereof, as in and by said assignments, or duly certified copies thereof here in Court to be produced will more fully appear.

5. Your orators further show that the art of electric spot or point welding covered by the claims of the aforesaid Letters Patent is of great value and importance in the art of manufacturing metal articles and particularly articles of sheet metal and that your orators have expended large sums of money in exploiting said invention and bringing the same to the notice of various manufacturing concerns and have been paid large sums of money for the right to use the invention of spot or point welding set forth in and covered by the claims of the aforesaid Letters Patent and continue to receive and expect to receive further large sums of money for said rights and that the wrongful acts of the defendant herein complained of will have the effect of encouraging others to violate your orators' exclusive rights and to refuse to pay the further sums of money due your orators for the grant of the rights to use said patented invention.

6. And your orators further show that the defendant was duly notified of the rights of your orators and of the Thomson Electric Welding Company of Maine in the premises but that after such notice, as your orators are informed and believe and accordingly aver, the defendant although well knowing the premises and exclusive rights of your orators and of the Thomson Electric Welding Company of Maine as aforesaid, in violation of said rights, and with the intent of depriving your orators and the Thomson Electric Welding Company of Maine of the benefit and advantages which would otherwise accrue to your orators from the possession of the exclusive rights conferred by the above mentioned Letters Patent, and without the license and consent of your orators or of the Thomson Electric Welding Company of Maine and against their will, and in infringement of said Letters Patent have been since the 20th day of July, 1909, within the Southern District of New York and at its factory in New York in said District, and elsewhere in the United States, using the art or method of electric point or spot welding set forth and claimed in the aforesaid Letters Patent and have made and sold metal plates, articles and metal work as set forth and claimed in said Letters Patent and that the defendant threatens to continue to so violate the exclusive rights conferred by the said Letters Patent and to install additional machines for practicing the said art or method and for manufacturing the metal work and articles set forth and claimed in said Letters Patent.

7. To the end therefore, that the defendant may, if it can, show why your orators should not have the relief herein prayed, and may, according to the best of its knowledge, information, remembrance and belief, full, true, and perfect answer make (but not under oath, an answer under oath being hereby expressly waived) to all and singular the matters herein stated and charged, as fully and particularly as if the same were here repeated and the defendant especially interrogated as to each and every of such matters; and that by a decree of this Court the defendant may be compelled to account for and pay over to your orators all damages which your orators and the Thomson Electric Welding Company of Maine have sustained, or shall sustain, on account of the defendant's infringement of said Letters Patent, together with all gains and profits resulting to the defendant from said infringement, and that the defendant, its officers, clerks, attorneys, agents, servants, and workmen, may be restrained, permanently and during the pendency of this suit, by an injunction, from using or practicing the method of uniting the component parts of composite sheet-metal structures as described and claimed in said Letters Patent and from using or causing to be used, machines or apparatus operating according to said method and from making, using and selling any metal plates or articles as described and claimed in said Letters Patent; and that it may be decreed to pay the costs of this suit and that your orators may have such other and further relief as the nature of this case may require, and to this Court may seem meet; may it please your

Honors to grant unto your orators not only a writ or writs of injunction conformable to the prayer of this bill but also a writ of subpoena ad respondendum, issuing out of and under the seal of this Honorable Court, directed to the said National Enameling and Stamping Company, commanding it to appear and make answer to this bill of complaint, and to perform and abide by such order and decree herein as to this Court may seem required by the principles of equity and good conscience.

And your Orators as in duty bound will ever pray.

(Seal) THOMSON ELECTRIC WELDING COMPANY,
By WILLIAM H. HODGES, *Secretary.*
UNIVERSAL ELECTRIC WELDING CO.,
By REGINALD HAWLEY, *Secretary.*

FISH, RICHARDSON, HERRICK & NEAVE,
HENRY C. TOWNSEND,
Solicitors and of Counsel for the Complainants.

State of Massachusetts, County of Suffolk, ss:

On this 16th day of November, 1910, before me personally appeared WILLIAM H. HODGES, and made oath that he is the Secretary of the said THOMSON ELECTRIC WELDING COMPANY, one of the complainants named in the foregoing bill; that he has read the foregoing bill subscribed to by him and knows the contents thereof; and that the same is true, of his own knowledge, except as to matters which are therein stated to be alleged on information and belief, and that as to those matters he believes it to be true.

J. SIDNEY STONE,
(Seal) *Notary Public.*
My Commission expires Apl. 23, 1915.

State of New York, County of Queens, ss:

On this 17th day of November, 1910, before me personally appeared REGINALD HAWLEY, and made oath that he is the Secretary of the said Universal Electric Welding Company; that he has read the foregoing bill subscribed by him and knows the contents thereof; and that the same is true, of his own knowledge, except as to matters which are therein stated to be based on information and belief, and that as to those matters, he believes it to be true.

J. A. GLENNON,
(Seal) *Notary Public.*
Filed Nov. 17, 1910.

Defendant's Exhibit No. 46.

CIRCUIT COURT OF THE UNITED STATES,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, COMPLAINANTS,

against

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

IN EQUITY.

TO THE CLERK OF THE UNITED STATES CIRCUIT COURT,
For the Southern District of New York:

PLEASE ENTER OUR APPEARANCE as solicitors for the defendant above named, National Enameling & Stamping Company.

Dated New York, January 2, 1911.

GUGGENHEIMER, UNTERMEYER & MARSHALL,
Solicitors for Defendant National Enameling & Stamping Company.
Office & Post Office Address,
37 Wall Street,
Borough of Manhattan,
New York City.

Filed Jan. 2, 1911.

IN THE CIRCUIT COURT OF THE UNITED STATES,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, PLAINTIFFS,

vs.

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

IN EQUITY 7-2.

DEFENDANT'S ANSWER.

TO THE HONORABLE JUDGES OF THE CIRCUIT COURT OF THE UNITED STATES, FOR THE SOUTHERN DISTRICT OF NEW YORK:

The Answer of the National Enameling and Stamping Company a Corporation duly organized and existing under the laws of the

State of New Jersey and having a principal place of business at No. 81 and 83 Fulton Street in the City of New York, in the State of New York, defendant herein, to the Bill of Complaint of the Thomson Electric Welding Company and the Universal Electric Welding Company, complainants herein.

This defendant, now and at all times hereafter saving and reserving to itself all and all manner of benefit and advantage of exception that can or may be had or taken to the manifold errors, uncertainties, imperfections and insufficiencies in the said bill of complaint contained, for answer thereto or to so much thereof as it is advised to be material or necessary for it to make answer unto, answering says:

FIRST: This defendant is not informed, save by the Bill of Complaint, whether the complainant, The Thomson Electric Welding Company is a corporation or is organized and exists under the Laws of the State of Massachusetts and therefore denies the same and leaves the complainants to make such proof thereof as they may be advised is material.

This defendant is not informed, save by the Bill of Complaint, whether the Complainant, The Universal Electric Welding Company, is a corporation duly organized and existing under the laws of the State of New York, and therefore denies the same and leaves the complainants to make such proof thereof as they may be advised is material.

This defendant admits that the National Enameling and Stamping Co. is a corporation duly organized under the laws of the State of New Jersey, and has a regular and established place of business in the City of New York and State of New York.

SECOND: This defendant, on information and belief, denies that Adolph F. Rietzel was or is the true, or the original, or the first inventor of a certain new and useful improvement in Uniting the Component Parts of Composite Sheet-Metal Structures or any new and useful improvements therein, as described in the specifications of the Letters Patent No. 928,701 and issued on the 20th day of July, 1909 to the Thomson Electric Welding Company of Lynn, Massachusetts, a corporation of Maine, as the assignee of the said Adolph F. Rietzel as alleged in said Bill of Complaint; denies that said Rietzel was the original and first inventor of the alleged improvement in Uniting the Component Parts of Sheet-Metal Structures, alleged to be since commonly known as Electric Spot or Point Welding; denies that the said invention was not known or used by others in this country before his (said Rietzel's) alleged invention; denies that it was not patented or described in any printed publication before his alleged invention or discovery, or more than two years prior to the filing in the United States Patent Office of his application for patent therefor; denies that the said method of electric spot welding was not in public use or machines therefor on sale in this country for more than two years before the date of his said application for said United States Let-

ters Patent; denies that said invention was not patented or caused to be patented by him or his legal representatives or assigns in any foreign country upon any application for patent filed more than one year prior to the filing on February 24, 1905 of his said application for United States Letters Patent here in suit. Whether said Rietzel made application in due form of law to the Commissioner of Patents of the United States for said alleged invention, or whether said Rietzel made or executed valid assignments of said invention or patent to the said Thomson Electric Welding Company of Maine, this defendant has no knowledge, information or belief and therefore leave the complainants to make proof thereof as they may be advised is material. But this defendant on information and belief denies that any title in and to said invention or Letters Patent became vested in said Company.

THIRD: This defendant admits that certain letters patent of the United States No. 928,701 bearing date July 20th, 1909 for an alleged improvement in Uniting the Component parts of Composite Sheet-Metal Structures were issued to Adolph F. Rietzel, assignor to Thomson Electric Welding Company, of Lynn, Massachusetts, a corporation of Maine, but it denies that said letters patent secured to said Rietzel or to said Thomson Electric Welding Company of Maine or the Complainants, the exclusive right, or any right, to make, use and vend the said alleged invention.

FOURTH: This defendant is not informed save by the Bill of Complaint as to whether the several instruments in writing set forth in the said Bill of Complaint as assigning and transferring to these complainants the rights and interests alleged in the Bill of Complaint as arising out of the said letters patent No. 928,701 were ever made, executed or recorded in the Patent Office of the United States as alleged, and therefore on information and belief denies the same and leaves the complainants to make such proof thereof as they may be advised is material.

FIFTH: This defendant further answering says it has no knowledge, information or belief that the said patent No. 928,701 is for the art of electric spot or point welding, or that spot or point welding is covered by the claims of the aforesaid Letters Patent or that it is of great value and importance, and therefore denies the same and leaves the complainants to make such proof thereof as they may be advised.

SIXTH: This defendant is not informed save by the Bill of Complaint whether or not Complainants have expended large sums of money in exploiting the invention purporting to be disclosed by said Letters Patent, or whether or not Complainants have spent large sums in bringing the said invention or patent to the notice of the various manufacturing concerns, and therefore deny the same, and leave the complainants to make such proof thereof as they may be advised is material;

Whether or not complainants have been paid large sums of money for the privilege of using the alleged invention of spot or

point welding set forth in and covered by the claims of said patent defendants do not know and are not informed save by said Bill of Complaint, and on information and belief therefore deny and require the Complainants to prove.

Whether or not complainants have received large sums of money for rights to use said invention, or expect to receive further large sums for such rights, defendants do not know and have not heard save as set forth in the Bill of Complaint, and therefore defendants deny the same and leave to Complainants to make proof.

SEVENTH: This defendant further answering denies that it has since the 20th day of July, 1909 used the art of electric point or spot welding set forth and claimed in the aforesaid Letters Patent No. 928,701, and denies that it has made, used or sold articles of sheet-metal that are an infringement of any claim of said patent.

This defendant admits that it has practiced and used a method of electrically welding sheet-metal articles, and was doing so for many years prior to the issue of said Letters Patent on the 20th day of July, 1909. Defendant avers that it is not indebted in the slightest degree to any disclosure in said patent of Complainants for the knowledge that defendant possesses of the art and method of electrically welding sheet-metal articles as the same has been practiced and used by the defendant long prior to July 20th, 1909, the date of said letters patent No. 928,701, and long prior to any knowledge or any information defendant has of said letters patent or of said Rietzel the alleged inventor thereof.

EIGHTH: This defendant further answering on information and belief, avers that the alleged improvements or inventions set forth in said patent 928,701 of Complainants are not new and useful, and their production does not and did not amount to invention in view of the state of the art existing prior to the date of the application of said Rietzel for his said letters patent.

NINTH: This defendant further answering, on information and belief avers that the said Adolph F. Rietzel for the purpose of deceiving the public made the descriptions and specifications filed by him in the Patent Office as a part of his application for said letters patent No. 928,701, to contain less than the whole truth relative to his alleged invention or discovery, and that the said Letters Patent No. 928,701 are therefore invalid and void.

TENTH: This defendant further answering says that the alleged invention described in said letters patent No. 928,701 was not, at the date of the application for said letters patent, a proper subject of letters patent of the United States, and did not involve, constitute or amount to invention or discovery but was in fact the mere adoption of the inventions or discoveries of others, made, used, patented and described in printed publications long prior to the application for said letters patent, and prior to the said alleged invention of said Adolph F. Rietzel.

ELEVENTH: This defendant further answering, on informa-

tion and belief, denies that the said Adolph F. Rietzel was the original or first inventor or discoverer of the improvements described and claimed in said Letters Patent No. 928,701 or of any material or substantial parts thereof and that the said alleged inventions, and improvements had been prior to the said alleged invention and discovery thereof by the said Adolph F. Rietzel, patented, described and shown in the following United States Letters Patent and had been known and used by the patentees thereof as follows, to wit:—

No. 396,015, Jany. 8, 1889, to Elihu Thomson
No. 403,707, May 21, 1889, to "
No. 403,708, May 21, 1889, to "
No. 423,966, March 25, 1890 to "
No. 434,468, Aug. 19, 1890 to Russell Robb
No. 444,928, Jan. 20, 1891, to Elihu Thomson
No. 462,261, Nov. 3, 1891 to Herman Lemp & Carl G. Anderson
No. 465,089, Dec. 15, 1891 to Elias E. Ries
No. 486,626, Nov. 22, 1892 to Geo. D. Burton & Edwin E. Angell
No. 496,019, Apr. 25, 1893 to Elihu Thomson
No. 974,808, May 23, 1893 to Arthur J. Moxham
No. 512,604, Jan. 9, 1894 to Charles L. Coffin,
No. 537,008, Apr. 9, 1895 to Geo. D. Burton and Edward E. Angell
No. 537,012, Apr. 9, 1895 to Geo. D. Burton and Edwin E. Angell
No. 537,013, Apr. 9, 1895 to Geo. D. Burton and Edwin E. Angell
No. 553,923, Feb. 4, 1896 to Herman Lemp
No. 560,366, May 19, 1896 to David W. Payne
No. 584,120, June 8, 1897 to David W. Payne and Eugene Diven
No. 616,435, Dec. 20, 1898 to Richard Eyre and Wm. Dishong
No. 616,436, Dec. 20, 1898 to Henry F. A. Kleinschmidt
No. 616,437, Dec. 20, 1898 to " "
No. 645,066, Mar. 13, 1900, to Robert P. Brown and Franklin E. Morse
No. 647,694, Apr. 17, 1900, to George D. Burton
No. 660,152, Oct. 23, 1900 to John R. Duncan
No. 670,808, Mar. 26, 1901 to John C. Perry
No. 686,558, Nov. 12, 1901 to Elihu Thomson
No. 690,958, Jan. 14, 1902 to Rudolph M. Hunter
No. 758,503, Apr. 26, 1904 to Herman G. Blevins and James E. Whittaker
No. 795,541, July 25, 1905 to Wm. S. Perry, Executor of John C. Perry

Also in the following foreign patents,—
BRITISH.
No. 1516 of 1862, No. 1412 of 1865, No. 361 of 1889
No. 377 of 1889, No. 21237 of 1890, No. 9975 of 1894
No. 2901 of 1890, No. 1963 of 1891, No. 22261 of 1898
BRITISH.
No. 4310 of 1890 No. 12322 of 1891 No. 11921 of 1903
No. 4657 of 1890 No. 845 of 1892 No. 22981 of 1903

No. 7989 of 1890 No. 17223 of 1892 No. 6127 of 1904
No. 11465 of 1890 No. 17227 of 1892 No. 10053 of 1904
No. 18523 of 1890 No. 9974 of 1894 No. 28301 of 1904
GERMAN
24,335—38,011—43,650—46,776—50,909—70,350
FRENCH
177,885—181,409—198,209—335,889—336,187.

And other United States and Foreign Letters Patent at present to the Defendant unknown, which Defendant prays leave, when discovered, to insert herein by amendment.

TWELFTH: This defendant further answering, on information and belief, avers that the said Adolph F. Rietzel was not the original or first inventor or discoverer of the inventions of Letters Patent No. 928,701 or of any material or substantial part thereof, but that the same and all material or substantial parts thereof was known and in public use and the products or articles claimed therein were on sale in this country prior to the date of said Rietzel's application for said Letters Patent No. 928,701 by the following named persons whose places of residence are given together with the places where such public use or sale occurred:

Edwin F. Angell, of Somerville, Mass., at Somerville, Mass. and elsewhere in the United States;

George D. Burton, of Somerville, Mass., at Somerville, Mass. and elsewhere in the United States.

Robert P. Brown, of New York, N. Y. at New York, N. Y. and elsewhere in the United States;

Hermann G. Blevin of Newcastle, Penna., at Newcastle, Penna. and elsewhere in the United States;

Charles L. Coffin, of Detroit, Mich., at Detroit, Mich., and elsewhere in the United States.

Eugene Diven, of Elmira, N. Y., at Elmira, N. Y., and elsewhere in the United States;

Thomas A. Edison, of Orange, N. J., at Orange, N. J., and elsewhere in the United States;

Richard Eyre, of Johnstown, Pa., at Johnstown, Pa., and elsewhere in the United States;

Rudolph M. Hunter, of Philadelphia, Pa., at Philadelphia, Pa., and elsewhere in the United States;

Henry F. A. Kleinschmdit, of Johnstown, Pa., at Johnstown, Pa., and elsewhere in the United States;

Lorain Steel Co., of Lorain, Ohio, at Lorain, Ohio, and elsewhere in the United States;

Arthur J. Moxham, of Johnstown, Pa., at Johnstown, Pa., and elsewhere in the United States;

Franklin E. Morse, of New York, N. Y., at New York, N. Y., and elsewhere in the United States;

David W. Payne, of Elmira, N. Y. at Elmira, N. Y., and elsewhere in the United States.

John C. Perry, of Clinton, Mass., at Clinton, Mass., and elsewhere in the United States;

Russell Robb, of Boston, Mass., at Boston, Mass., and elsewhere in the United States.

Elias E. Ries, of Baltimore, Md., at Baltimore, Md., and elsewhere in the United States;

Elihu Thomson, of Lynn, Mass., at Lynn, Mass., and elsewhere in the United States;

Henry C. White, of Worcester, Mass., at Worcester, Mass., and elsewhere in the United States:

And by others at present to this defendant unknown, the names and addresses of whom and the places where the said uses and sale occurred the defendant, when discovered, prays leave to insert herein by amendment.

THIRTEENTH: This defendant further answering on information and belief avers that the methods claimed in said Letters Patent No. 928,701 are merely an adaptation of old and known methods to accomplish no novel result, and consist in the omission of a step or steps of said old and known methods with the omission in said claims of a statement of the purpose or result accomplished by said steps.

FOURTEENTH: This defendant further answering avers that the methods claimed in said Letters Patent of the United States No. 928,701 granted to said Rietzel are fully disclosed in the prior Letters Patent of the United States No. 690,958 issued to Rudolph M. Hunter, January 14, 1902 but are not claimed therein, said prior patent having been granted more than two years before said Rietzel filed his application for said patent No. 928,701, and that therefore the said methods were dedicated to the public by said Hunter, and could not in law be claimed by said Rietzel.

FIFTEENTH: This defendant further answering on information and belief alleges that the said Letters Patent No. 928,701 are invalid by reason of the fact that the claims thereof are too broad in view of the state of the prior art at the time that the application for such Letters Patent was filed, and also by reason of the fact that said claims were so greatly expanded beyond what they were when the Rietzel application was originally filed, as to describe a different invention.

SIXTEENTH: This defendant further answering denies all and all manner of wrongdoing wherewith it is charged in the bill of complaint, asserts that the said patent 928,701 has never been adjudicated in the Courts, and denies the right of Complaiannts to an injunction or an accounting, or any other relief prayed for in said Bill or otherwise, and defendant prays the same advantage for this answer as if it had pleaded the several matters and things aforesaid, as if for the reasons thereof it had demurred to the said bill of complaint where demurrer would have been proper, and the same benefit thereof as if it had specially pleaded to the bill where a special plea would have been proper; and it submits to this

Honorable Court that the premises considered the Complainants have no right to any further answer to said bill or any part thereof than is hereinbefore contained, and no right to any discovery, injunction, accounting, or any relief prayed for in said bill, and this defendant prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

NATIONAL ENAMELING & STAMPING CO. (Seal)
By A. M. STEINHARDT, *Treasurer.*

GUGGENHEIMER, UNTERMYER & MARSHALL,
Solicitors for Defendant,
37 Wall Street,
New York City, N. Y.

SAML. UNTERMYER,
Of Counsel.

(Endorsed) U. S. Circuit Court, Southern District N. Y., Filed Feb. 4, 1911, John A. Shields, Clerk.

IN THE CIRCUIT COURT OF THE UNITED STATES,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, PLAINTIFFS,

vs.

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

IN EQUITY 2-7

REPLICATION.

The replication of the above-named plaintiffs to the answer of the above-named defendant.

These replicants, saving and reserving to themselves all and all manner of advantage of exception which may be had and taken to the manifold errors, uncertainties, and insufficiencies of the answer of said defendant, for replication thereunto say that they do and will ever maintain and prove their said bill to be true, certain, and sufficient in the law to be answered unto by said defendant, and that the answer of said defendant is very uncertain, evasive, insufficient in the law to be repied unto by these replicants; without this, that any other matter or thing in the said answer contained material or effectual in the law to be replied unto, confessed, or avoided, traversed or denied, is true; all which matters and things these replicants are ready to aver, maintain, and prove as this Honorable Court shall direct, and humbly as in and by their said bill they have already prayed.

HENRY C. TOWNSEND,
Solicitor for Complainants.

New York, March 6th, 1911.
Filed March 6, 1911.

IN THE CIRCUIT COURT OF THE UNITED STATES,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, PLAINTIFFS,

against

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

IN EQUITY 7-2.

IT IS HEREBY CONSENTED by and between the parties to the above entitled action, that the defendant's answer be, and the same hereby is, amended nunc pro tunc, as of the date of the filing of the answer, by striking out of Paragraph Eleventh thereof the words "No. 4310 of 1890", and inserting in lieu thereof the words "No. 14310 of 1890", and by striking out of Paragraph Eleventh thereof the words "German 24335—38011—43650—46776—50909—70350; and inserting in lieu thereof the words "Austrian 24335; German 38011 — 43650 — 46776 — 50909 — 70350;" and it is further agreed that the replication heretofore filed stand as the replication to the answer as amended.

Dated New York, May 31, 1911.

HENRY C. TOWNSEND,
Plaintiffs' Attorney.

GUGGENHEIMER, UNTERMYER & MARSHALL,
Defendant's Attorneys.

So ordered:
E. H. LACOMBE,
U. S. Cir. Judge.
Filed June 1, 1911.

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING CO. & ANO., COMPLAINANTS,

against

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

State and County of New York, ss:

FREDERICK B. BERTRAND, JR., being duly sworn, says that he is Clerk in the office of Guggenheimer, Untermyer & Mar-

shall, the Attorneys for the above named defendant. That he resides at 444 E. 85th St., N. Y. City. Deponent further says, he did, on the 2nd day of June, 1913, serve upon Universal Electric Welding Co. one of the complainants in the above entitled action, a Proposed Decree and Notice of Settlement of which the annexed is a copy, by depositing the same, properly inclosed in a postpaid wrapper, in the Post Office Box at 37 Wall St., N. Y. C. directed to said Universal Electric Welding Co. at 47 West Street, New York City, that being the address, where it then kept an office, between which places there was and now is a regular communication by mail.

FREDERICK B. BERTRAND, JR.

Sworn and subscribed before me, this 2nd day of June, 1913.

RAPHAEL BRILL,

(Seal) *Notary Public, No. 151, N. Y. County.*

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING CO. & ANO., COMPLAINANTS,

against

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

State and County of New York, ss:

FREDERICK B. BERTRAND, JR., being duly sworn, says that he is a clerk in the office of Guggenheimer, Untermyer & Marshall, the Attorneys for the above named Defendant. That he resides at 444 E 85th St., N. Y. C. Deponent further says, he did, on the 2nd day of June, 1913, serve upon Thomson Electric Welding Co. one of the complainants in the above entitled action, a proposed decree and notice of settlement, of which the annexed is a copy, by depositing the same, properly inclosed in a post-paid wrapper, in the Post Office Box at No. 37 Wall Street, N. Y. City, directed to said Thomson Electric Welding Co. at Lynn, Mass. that being the address where it then kept an office, between which places there then was and now is a regular communication by mail.

FREDERICK S. BERTRAND, JR.

Sworn and subscribed to before me, the 2nd day of June, 1913.

RAPHAEL BRILL,

(Seal) *Notary Public, No. 15, N. Y. County.*

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, COMPLAINANTS,

against

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

SIRS:

PLEASE TAKE NOTICE that annexed copy of a decree which will be presented for settlement to Honorable George C. Holt, one of the Justices of this Court at the Court House in the Post Office Building, Borough of Manhattan, City of New York, on the 9th day of June, 1913, at 10 o'clock in the forenoon of that day.

Dated New York, June 2, 1913.

Yours, &c.,

GUGGENHEIMER, UNTERMYER & MARSHALL,
Solicitors for Defendant,
Office and P. O. Address,
37 Wall Street,
Bor. of Manhattan,
N. Y. City.

To

FISH, RICHARDSON, HERRICK & NEAVE,
5 Nassau Street, N. Y. City,
HENRY C. TOWNSEND,
149 Broadway, N. Y. City.
Solicitors and of Counsel for Complainants.

Thomson Electric Welding Company,
Lynn, Mass.
Universal Electric Welding Company,
47 West Street,
N. Y. City.

At the March Term of the United States District Court for the Southern District of New York, held at the Court House thereof, in the Post Office Building, in the Borough of Manhattan, City of New York, on the 9th day of June, 1913.

PRESENT:

HON. GEORGE C. HOLT,
Justice.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, COMPLAINANTS,

against

NATIONAL ENAMELING & STAMPING COMPANY, DEFENDANT.

It appearing that the replication herein was filed on March 6, 1911 and that no testimony had been taken, and the above case

coming on to be heard at this Court on the fifth day of March, 1913, and no one appearing for the Complainants, it is on motion of Guggenheimer, Untermyer & Marshall, Solicitors for the Defendant,

ORDERED and ADJUDGED that the above entitled action be and the same is hereby dismissed for lack of prosecution without prejudice and without costs.

Enter:

GEO. C. HOLT,
U. S. D. J.

Filed June 10, 1913.

United States of America, Southern District of New York, ss.:

I, ALEXANDER GILCHRIST, Jr., Clerk of the District Court of the United States for the Southern District of New York, do hereby certify that the Writings annexed to this Certificate, viz: the papers in the case of Thomson Electric Welding Company and Universal Electric Welding Company, Plaintiffs, vs. National Enameling & Stamping Company, Defendant, Eq. 7-2, have been compared by me with their originals on file and remaining of record in my office; that they are correct transcripts therefrom and of the whole of the said originals.

IN TESTIMONY WHEREOF I have hereunto subscribed my name and affixed the seal of the said Court at the City of New York, in the Southern District of New York, this 10th day of May, in the year of our Lord one thousand nine hundred and Nineteen, and of the Independence of the said United States the one hundred and forty-third.

(Seal)

ALEXANDER GILCHRIST,
Clerk.

Defendant's Exhibit No. 47.

UNITED STATES DISTRICT COURT.

EASTERN DISTRICT OF NEW YORK.

Docket 11

TITLE OF CASE

THOMPSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY

vs.

UNITED STATES METAL PRODUCTS COMPANY.

ATTORNEY

HENRY C. TOWNSEND
EDWARDS, SAGER & WOOSTER

1912		
March	28	Bill of complaint and praecipe for subpoenas filed; subpoena issued returnable the first Monday in May, 1912.
May	6	Subpoena returned. Served on defendant
"	"	Edwards, Sager & Wooster enter appearance for defendant
June	3	Answer filed.
July	1	Replication filed
1913		
March	14	Dismissed from calendar

Eastern District of New York, ss.

I, PERCY G. B. GILKES, Clerk of the District Court of the United States for the Eastern District of New York, do hereby certify that the foregoing is a true copy of the original docket entries remaining of record in my office in the suit of Thomson Electric Welding Co. et al. versus United States Metal Products Co.

In Testimony Whereof, I have caused the Seal of said Court to be hereunto affixed, at the Borough of Brooklyn, in the Eastern District of New York, this 17th day of April in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States the one hundred and forty-third.

(Seal) PERCY G. B. GILKES, *Clerk.*

By J. G. COLMAN, *Deputy Clerk.*

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Defendant's Exhibit No. 48.

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE EASTERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, PLAINTIFFS,

vs.

UNITED STATES METAL PRODUCTS COMPANY, DEFENDANT.

IN EQUITY, No. 11.

BILL OF COMPLAINT.

To the Judges of the District Court of the United States for the Eastern District of New York:

1. The Thomson Electric Welding Company, a corporation duly organized and existing under the laws of the State of Massachusetts and having a principal place of business at Lynn, in the State of Massachusetts, and the Universal Electric Welding Company, a corporation duly organized and existing under the laws of the State of New York and having a principal place of business in the Borough of Queens, in the City of New York, State of New York, bring this, their bill of complaint, against the United States Metal Products Company, a corporation organized and existing under the laws of the State of Massachusetts and having a regular and established place of business, and having committed acts of infringement, as hereinafter complained of, at College Point, within the Eastern District of New York, and thereupon your orators complain and say:

2. That, as your orators are informed and believe and accordingly aver, Adolph F. Rietzel, being a citizen of the United States and a resident of Lynn, in the County of Essex and State of Massachusetts, and prior to the twenty-fourth day of February, Nineteen Hundred and Five, was the inventor of certain new and useful improvements in Uniting the Component Parts of Metal Structures, since commonly known in the art as Electric Spot or Point Welding, and not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof or more than two years prior to his hereinafter recited application for patent therefor, and not in public use or on sale in this country for more than two years before his said application for Letters Patent, and not patented or caused to be patented by him or his legal representatives or assigns in any foreign country, upon any application for foreign patent filed more than one year prior to the filing of his hereinafter recited application for patent for said invention.

3. And your orators further show that after the filing of his

hereinafter recited application for Letters Patent and before the issuance of the Letters Patent, the said Adolph F. Rietzel, by an instrument in writing executed and delivered on or about the twenty-third day of March, Nineteen Hundred and Five, and recorded in the Transfers of Patents in the United States Patent Office on the twenty-second day of June, Nineteen Hundred and Five, in Liber H 72, p. 141, did sell, assign and transfer unto the Thomson Electric Welding Company, a corporation organized and existing under the laws of the State of Maine and having its principal office and place of business in the City of Lynn, State of Massachusetts, its successors and assigns, the whole right, title and interest in and to his aforesaid invention and application for patent therefor hereinafter recited and did authorize and request the Commissioner of Patents to issue the Letters Patent for said invention to the said Company as the sole owner thereof.

4. And your orators further show on information and belief that the said Adolph F. Rietzel made application according to law for Letters Patent of the United States for the aforesaid invention and that thereafter and after due proceedings had in all respects, and in pursuance of the aforesaid assignment, Letters Patent in due form of law for said invention were issued and delivered to the aforesaid Thomson Electric Welding Company, a corporation of Maine, as assignee of the said Adolph F. Rietzel, in the name of the United States of America under the seal of the Patent Office and signed by the Commissioner of Patents, granting to the said Thomson Electric Welding Company, a corporation of Maine, its successors and assigns, for the term of seventeen years from the twentieth day of July, 1909, the exclusive right to make, use and vend the said invention of Adolph F. Rietzel throughout the United States and the Territories thereof, as by said Letters Patent numbered 928,701, and dated July 20th, Nineteen Hundred and Nine, or a duly exemplified copy thereof, in Court to be produced, will more fully and at large appear.

5. And your orators further show that after the aforesaid assignment by Adolph F. Rietzel and prior to the issuance of the before-mentioned Letters Patent the Thomson Electric Welding Company of Maine to whose rights your orator, the Thomson Electric Welding Company of Massachusetts succeeded, as herein set forth, entered into a certain agreement with your orator, the Universal Electric Welding Company, which agreement, ever since the issuance of said patent and up the beginning of this action, has been continuously in full force and effect, whereby your orator, the Universal Electric Welding Company, acquired the exclusive right to use the invention covered by the aforesaid Letters Patent in connection with machines built by said Thomson Electric Welding Company of Maine or with its permission, and leased to your orator, the Universal Electric Welding Company, upon a continuing fixed annual rental or royalty, to be paid to the said Thomson Electric Welding Company of Maine, its successors and assigns,

together with the right to sub-lease and let said machines, subject to the conditions and covenants of said agreement.

6. And your orators further show that until the execution and delivery of the instruments in writing specified in the next succeeding paragraph numbered 7, of this bill, the said Thomson Electric Welding Company of Maine remained the sole owner of the entire legal right, title and interest in and to the aforesaid Letters Patent and of all the rights, interests, obligations and remedies belonging to it by virtue of the aforesaid agreement between it and your orator, the Universal Electric Welding Company.

7. Your orators further show that by two certain instruments in writing executed and delivered respectively on or about the 11th day of March, 1910, and the 18th day of April, 1910, and duly recorded respectively in the Transfers of Patents in the United States Patent Office, July 19th, 1910, Liber S 84, p. 292 and 294, and April 27th, 1910, in Liber J 84, p. 112, the Thomson Electric Welding Company of Maine did sell, assign, transfer and convey unto your orator, the Thomson Electric Welding Company of Massachusetts, all its property, both real and personal, and all its assets, both tangible and intangible, of every nature and wherever situated, including the entire right, title and interest in and to the aforesaid invention and Letters Patent and the right to sue and recover for past infringement of said Letters Patent, and that your orator, the Thomson Electric Welding Company of Massachusetts, has ever since and up to the beginning of this action been the owner of all the rights, titles and interests thereby conveyed in and to the aforesaid Letters Patent and rights of action and in and under the aforesaid contract between your orator, the Universal Electric Welding Company and the Thomson Electric Welding Company of Maine.

8. Your orators further show that the art of electric spot or point welding covered by the claims of the aforesaid Letters Patent is of great value and importance in the art of manufacturing metal articles and particularly articles of sheet metal and that your orators have expended large sums of money in exploiting said invention and bringing the same to the notice of various manufacturing concerns and have been paid large sums of money for the right to use the invention of spot or point welding set forth in and covered by the claims of the aforesaid Letters Patent and continue to receive and expect to receive further large sums of money for said rights and that the wrongful acts of the defendant herein complained of will have the effect of encouraging others to violate your orators' exclusive rights and to refuse to pay the further sums of money due your orators for the grant of the rights to use said patented invention.

9. And your orators further show that the defendant was duly notified of the rights of your orators in the premises but that after such notice, as your orators are informed and believe and accordingly aver, and well knowing the premises and exclusive rights of your orators as aforesaid, and in violation of said rights, and with the intent of depriving your orators of the benefit and advantages

which would otherwise accrue to your orators from the possession of the exclusive rights conferred by the above-mentioned Letters Patent, and without the license and consent of your orators and against their will, and in infringement of said Letters Patent within six years before the commencement of this suit, did, within the Eastern District of New York and at its factory in College Point in said District, use the art or method of electric point or spot welding set forth and claimed in the aforesaid Letters Patent and did make and sell metal plates, articles and metal work set forth and claimed in said Letters Patent and threatens to continue to so violate the exclusive rights conferred by the said Letters Patent and to install additional machines for practicing the said art or method and manufacturing the metal work and articles set forth and claimed in said Letters Patent, without the license and consent of your orators and against the will of your orators and in infringement of said Letters Patent.

10. And your orators further show, on information and belief, that the machine used in practicing the electric point or spot welding complained of and on which the metal plates, articles and metal work complained of are made, is specially designed, adapted and constructed for the purpose of such use, and was sold to the predecessors of the defendant, United States Metal Products Company, from whom your orators aver, on information and belief, the said defendant, United States Metal Products Company, obtained title by The Toledo Electric Welding Company, a corporation of Ohio, and that the said The Toledo Electric Welding Company is engaged in the business of selling and has already sold, within six years before the commencement of this suit, a large number of machines of substantially the same design and construction, to other persons, for the same use; and for as much as the said The Toledo Electric Welding Company is out of the jurisdiction of this Court and as your orators are informed and believe, has agreed to defend any suits for infringement of the aforesaid Letters Patent brought against any users of machines sold by it, and for as much as said Company is largely interested in the event of this suit, these Complainants hereby invite the said The Toledo Electric Welding Company to appear and be made a party-defendant in this suit and to defend the party named as defendant.

11. TO THE END THEREOF, that the defendant may, if it can, show why your orators should not have the relief herein prayed, and may, according to the best of its knoweldge, information, remembrance and belief, full, true, and perfect answer make (but not under oath, an answer under oath being hereby expressly waived) to all and singular the matters herein stated and charged, as fully and particularly as if the same were herein repeated and the defendant especially interrogated as to each and every of such matters; that by a decree of this Court the defendant may be compelled to account for and pay over to your orators all damages which your orators have sustained, or shall sustain, on account of the defendant's in-

fringement of said Letters Patent, together with all gains and profits resulting to the defendant from said infringement; that the defendant, its officers, clerks, attorneys, agents, servants, and workmen, may be restrained, permanently and during the pendency of this suit, by an injunction, from using or practicing the method of uniting the component parts of composite sheet metal structures as described and claimed in said Letters Patent and from using or causing to be used, machines or apparatus operating according to said method and from making, using and selling any metal plates or articles as described and claimed in said Letters Patent; that it may be decreed to pay the costs of this suit and that your orators may have such other and further relief as the nature of this case may require, and to this Court may seem just.

12. MAY IT PLEASE YOUR HONORS to grant to your orators not only a writ of injunction but also a writ of subpoena, issuing out of and under the seal of this Honorable Court, and directed to the said United States Metal Products Company, and commanding it to appear and make answer to this bill of complaint, and to perform and abide by such order and decree herein as to this Court shall seem just.

THOMSON ELECTRIC WELDING CO.
By W. H. HODGE, *Secretary.*

(Seal) UNIVERSAL ELECTRIC WELDING CO.
REGINALD HAWLEY, *Acting Secretary.*

HENRY C. TOWNSEND,
Solicitor for Plaintiffs.
FREDERICK P. FISH,
Of Counsel.

State of Massachusetts, County of Essex, ss:

On this 20th day of March, 1912, before me personally appeared W. H. Hodges and made oath that he is the Secretary of the said THOMSON ELECTRIC WELDING COMPANY; that he has read the foregoing bill subscribed by him and knows the contents thereof; and that the same is true, of his own knowledge, except as to matters which are therein stated to be based on information and belief, and that as to those matters, he believes it to be true.

HAMSON P. BURRILL,
(Seal) *Notary Public.*
(SEAL)
Commission expires June 14, 1912.

State of New York, County of Queens, ss:

On this 28th day of March, 1912, before me personally appeared Reginald Hawley, and made oath that he is the Acting Secretary of the said UNIVERSAL ELECTRIC WELDING COMPANY; that he has read the foregoing bill subscribed by him and knows the contents thereof; and that the same is true, of his own knowledge, except as to matters which are therein stated to be based on information and belief, and that as to those matters, he believes it to be true

CHARLES BRESLOFF,
(Seal) *Notary Public, Queens Co.*

UNITED STATES DISTRICT COURT, FOR THE EASTERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDINDG COMPANY, COMPLAINANTS,

vs.

UNITED STATES METAL PRODUCTS COMPANY, DEFENDANT.

IN EQUITY NO. 928,701—ON RIETZEL PATENT.

ANSWER.

To the Honorable the Judges of the United States District Court for the Eastern District of New York:

This defendant, now and at all times, saving and reserving unto itself all benefit and advantage of exception which can or may be had or taken to the manifold errors, uncertainties, imperfections, and insufficiencies of said bill of complaint for answer thereunto, or unto so much or such part thereof as defendant is advised it is material or necessary to make answer unto, says:

1. Defendant answering says that it is not informed, save by said bill of complaint, as to whether the complainant, Thomson Electric Welding Company, is a corporation duly organized and existing under the laws of the State of Massachusetts, having a principal place of business at Lynn, in said State, or whether the complainant, Universal Electric Welding Company, is a corporation duly organized and existing under the laws of the state of New York, having a principal place of business in the Borough of Queens, in the City and State of New York, as alleged in the said Bill of Complaint, and therefore denies the same, but defendant, United States Metal Products Company, admits that it is a corporation duly organized and existing under the laws of the State of Massachusetts and having a regular and established place of business at College Point, in the Eastern District of New York.

2. Defendant answering, upon information and belief, denies that heretofore and prior to the 24th day of February, 1905, one Adolph F. Rietzel was the true, original and first inventor or discoverer of the alleged new and useful improvements in Uniting the Component Parts of Metal Structures, or electric spot or point welding, as set forth in said bill of complaint, or any material or substantial part thereof, and denies that said alleged invention or improvement was not known or used in this country before his alleged invention or discovery thereof, and not patented or described in any printed publication in this or in any foreign country before the alleged invention or discovery thereof by said Adolph F. Rietzel, and denies that the said alleged invention was not in public use or on sale in the United States for more than two years prior to his application for Letters

Patent therefor or that the same had not been patented or caused to be patented by him or his legal representatives or assigns in any foreign country upon an application for foreign patent filed more than twelve months prior to the filing of his application for Letters Patent of the United States thereof, and were not, nor had not been abandoned.

3. Defendant, further answering, says that it has no knowledge, save as derived from the bill of complaint herein, as to whether the said Adolph F. Rietzel, by an instrument in writing alleged to have been executed, delivered and recorded in the Patent Office, sold, assigned or transferred unto the Thomson Electric Welding Company, a corporation of Maine, all of his alleged right, title or interest in and to the said application for Letters Patent, or in and to the alleged invention or improvement therein described, or as to whether the said alleged instrument in writing authorized or requested the Commissioner of Patents to grant unto the said Thomson Electric Welding Company, of Maine, any Letters Patent which might be issued pursuant to said application, and therefore leaves complainant to make such proof thereof as it may be advised.

4. Defendant, further answering, upon information and belief, admits that Letters Patent of the United States, No. 928,701, were issued to Thomson Electric Welding Company, a corporation of Maine, on the 20th day of July, 1909, but whether or not the said Letters Patent were signed, sealed, executed or issued in due form of law in all respects, or whether the provisions of the statutes of the United States in such case made and provided were only or at all complied with, this defendant has no knowledge, and therefore leaves complainant to make such proof thereof as it may; but this defendant denies that there was any valid grant unto the said Thomson Electric Welding Company, of Maine, its successors or assigns for the term of seventeen years from the date of said Letters Patent of the alleged full and exclusive right of making, using or vending to others to be used the said alleged improvements.

5. This defendant is not informed, save by the bill of complaint, as to whether the several instruments in writing set forth in said bill of complaint as assigning and transferring to these complainants or any of them the rights and interests alleged in the bill of complaint as arising out of the said Letters Patent, No. 928,701, were ever made, executed or recorded in the Patent Office of the United States as alleged, and therefore, upon information and belief, denies the same and leaves the complainants to make such proof thereof as they may be advised is material.

6. This defendant, further answering, says that it has no knowledge, information or belief that the said Letters Patent No. 928,701 is for the art of electric spot or point welding; or that spot or point welding is covered by the claims of the aforesaid Letters Patent, or that it is of great value and importance or that complainants have expended large sums of money in exploiting the aforesaid alleged invention of said Letters Patent, or whether or not complaiannts

have spent large or any sums of money in bringing said alleged invention to the notice of the various manufacturing concerns, or whether complainants have been paid large or any sums of money for the privilege of using the alleged invention covered by the claims of said patent, or as to whether or not complainants have received large or any sums of money for rights to use said invention or expect to receive further large or any sums of money for such rights, and therefore denies the same.

7. Defendant, further answering, upon information and belief, denies that it has had any knowledge of the premises set forth in the bill of complaint, or of the alleged exclusive rights or privileges of the complainants herein, or without the alleged license or permission of said complainants, or against their will and restraint, or in violation or infringement of their alleged rights under said Letters Patent, since the issuance thereof, or within six years prior to the filing of the bill of complaint herein, or at any other time, unlawfully or wrongfully made, used or sold within the Eastern District of New York, and at its factory in College Point, in said District, or elsewhere within the United States, or now continues or threatens to continue to make, use or sell in said District any metal plates, articles or metal work embodying, containing or employing the alleged invention of said Letters Patent or any substantial or material parts thereof in alleged violation of complainant's rights.

8. Defendant, further answering, upon information and belief, says that it is not informed, save as alleged in the bill of complaint herein, as to whether the allegations set forth in paragraph 10 of said bill of complaint are true and correct, and therefore denies the same and leaves complainants to make such proof thereof as they may be advised.

9. This defendant, further answering, on information and belief, avers that the said Adolph F. Rietzel, for the purpose of deceiving the public, made the descriptions and specifications filed by him in the Patent Office as a part of his application for said Letters Patent No. 928,701, to contain less than the whole truth relative to his alleged invention or discovery, and that the said Letters Patent No. 928,701 are therefore invalid and void.

10. This defendant, further answering, says that the alleged invention described in said Letters Patent No. 928,701 was not, at the date of the application for said Letters Patent, a proper subject of Letters Patent of the United States, and did not involve, constitute or amount to invention or discovery, but was in fact the mere adoption of the inventions or discoveries of others, made, used, patented and described in printed publications long prior to the application for said Letters Patent, and prior to the said alleged invention of said Adolph F. Rietzel.

11. This defendant, further answering, on information and belief, denies that the said Adolph F. Rietzel was the original and first inventor or discoverer of the improvements described and claimed in said Letters Patent No. 928,701 or of any material or substantial

parts thereof and that the said alleged inventions, and improvements had been prior to the said alleged invention and discovery thereof by the said Adolph F. Rietzel, patented, described and shown in the following United States Letters Patent and had been known and used by the patentees thereof as follows, to wit:—

No. 396,015	Jan. 8, 1889	to Elihu Thomson	
403,707	May 21, 1889	" "	
403,708	May 21, 1889	" "	
423,966	Mar. 25, 1890	" "	
434,468	Aug. 19, 1890	Russell Robb	
444,928	Jan. 20, 1891	Elihu Thomson	
462,261	Nov. 3, 1891	Herman Lemp & Carl G. Anderson	
465,089	Dec. 15, 1891	Elias E. Ries	
486,626	Nov. 22, 1892	George D. Burton & Edwin E. Angell	
496,019	Apr. 25, 1893	Elihu Thomson	
497,808	May 23, 1893	Arthur J. Moxham	
512,604	Jan. 9, 1894	Charles L. Coffin	
537,008	Apr. 9, 1895	George D. Burton & E.E. Angell	
537,012	Apr. 9, 1895	" " " " " "	
537,013	Apr. 9, 1895	" " " " " "	
553,923	Feb. 4, 1896	Herman Lemp	
560,366	May 19, 1896	David W. Payne	
584,120	June 8, 1897	D. W. Payne & Eugene Diven	
616,435	Dec. 20, 1898	Richard Eyre & Wm. Dishong	
616,436	Dec. 20, 1898	Henry F. A. Kleinschmidt	
616,437	Dec. 20, 1898	" " " "	
645,066	Mar. 13, 1900	Robert P. Brown & Franklin E. M. Morse.	
647,694	Apr. 17, 1900	George D. Burton	
660,152	Oct. 23, 1900	John R. Duncan	
670,808	Mar. 26, 1901	John C. Perry	
868,558	Nov. 12, 1901	Elihu Thomson	
690,958	Jan. 14, 1902	Rudolph M. Hunter	
758,503	Apr. 26, 1904	Herman G. Blevins & James E. Whittaker	
795,541	July 25, 1905	William S. Perry, Executor of John C. Perry	

Also in the following foreign patents:—

British.

No. 1516	of 1862	No. 9975	of 1894
1412	1865	22261	1898
361	1889	11921	1903
377	1889	22981	1903
2901	1890	6127	1904
14310	"	10053	1904
4657	"	28301	1904
7989	"		

11465	"
18523	"
21237	"
1963	1891
12322	"
845	1892
17223	"
17227	"
9974	1894

Austrian.

24,335

German.

38,011 — 43,650 — 46,776 — 50,909 — 70350

French.

177,885 — 181,409 — 198,209 — 335,889 — 336,187

And other United States and foreign Letters Patent at present to the defendant unknown, which defendant prays leave when discovered to insert herein by amendment.

12. This defendant, further answering, on information and belief, avers that the said Adolph F. Rietzel was not the original or first inventor or discoverer of the alleged inventions of Letters Patent No. 928,701 or of any material or substantial part thereof, but that the same and all material or substantial parts thereof was known and in public use and the products or articles claimed therein were on sale in this country prior to the date of said Rietzel's application for said Letters Patent No. 928,701 by the following named persons whose places of residence are given, together with the places where such public use or sale occurred:

Edwin E. Angell, of Somerville, Mass., at Somerville, Mass., and elsewhere in the United States;

George D. Burton, of Somerville, Mass., at Somerville, Mass., and elsewhere in the United States;

Robert P. Brown, of New York City, N. Y., at New York City, N. Y., and elsewhere in the United States;

Herman G. Blevin, of Newcastle, Penn., at Newcastle, Penn., and elsewhere in the United States;

Charles L. Coffin, of Detroit, Mich., at Detroit, Mich., and elsewhere in the United States.

Eugene Diven, of Elmira, N. Y., at Elmira, N. Y., and elsewhere in the United States;

Thomas A. Edison, of Orange, N. J., at Orange, N. J., and elsewhere in the United States;

Richard Eyre, of Johnstown, Pa., at Johnstown, Pa., and elsewhere in the United States;

Rudolph M. Hunter, of Philadelphia, Pa., at Philadelphia, pa., and elsewhere in the United States;

Henry F. A. Kleinschmidt of Johnstown, Pa., at Johnstown, Pa., and elsewhere in the United States;

Lorain Steel Co., Lorain, Ohio, at Lorain, Ohio, and elsewhere in the United States;
Arthur J. Moxham, of Johnstown, Pa., at Johnstown, Pa., and elsewhere in the United States;
Franklin E. Morse, New York City, N. Y., at New York City, N. Y., and elsewhere in the United States;
David W. Payne, Elmira, N. Y., at Elmira, N. Y., and elsewhere in the United States;
John C. Perry, of Clinton, Mass., at Clinton, Mass., and elsewhere in the United States;
Russell Robb, of Boston, Mass., at Boston, Mass., and elsewhere in the United States;
Elias E. Ries, of Baltimore, Md., at Baltimore, Md., and elsewhere in the United States;
Elihu Thomson, of Lynn, Mass., at Lynn, Mass., and elsewhere in the United States;
Henry C. White, Worcester, Mass., at Worcester, Mass., and elsewhere in the United States.

And by others at present to this defendant unknown, the names and addresses of whom and the places where the said uses and sale occurred by defendant, when discovered, prays leave to insert herein by amendment.

13. This defendant further answering on information and belief avers that the methods claimed in said Letters Patent No. 928,701 are merely an adaptation of old and known methods to accomplish no novel result, and consists in the omission of a step or steps of said old and known methods with the omission in said claims of a statement of the purpose or result accomplished by said steps.

14. This defendant further answering on information and belief alleges that the said Letters Patent No. 928,701 are invalid by reason of the fact that the claims thereof are too broad in view of the state of the prior art at the time that the application for such Letters Patent was filed, and also by reason of the fact that said claims were so greatly expanded beyond what they were when the Rietzel application was originally filed, as to describe a different invention.

15. Defendant further answering on information and belief alleges that if any invention is involved in the claims in suit of the Rietzel patent No. 928,701, that then, and in that event, the said Rietzel patent was surreptitiously and unjustly obtained for that which was in fact invented by one Johann Harmatta, of Szepesvaralja, Hungary, who was using reasonable diligence in adapting and perfecting the same.

16. This defendant further answering denies all and all manner of wrongdoing wherewith it is charged in the bill of complaint, asserts that the said patent No. 928,701 has never been adjudicated in the courts, and denies the rights of complainants to an

injunction or an accounting, or any other relief prayed for in said bill or otherwise, and defendant prays the same effect for this answer as if it had pleaded the several matters and those aforesaid, as if for the reasons thereof it had demurred to the said bill of complaint where a demurrer would have been proper, and the same benefit thereof as if it had specially pleaded to the bill where a special plea would have been proper, and defendant submits to this Honorable Court and insists that the premises considered the complainants have no right to any further answer to said bill or any part thereof than is hereinbefore contained, and no right to any discovery, injunction, accounting, or any relief prayed for in said bill, and this defendant prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

EDWARDS, SAGER & WOOSTER,
Solicitors for Defendant,
2 Rector Street,
Borough of Manhattan,
New York, N. Y.

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE EASTERN DISTRICT OF NEW YORK.

THOMSON ELECTRIC WELDING COMPANY and UNIVERSAL ELECTRIC WELDING COMPANY, PLAINTIFFS,

vs.

UNITED STATES METAL PRODUCTS COMPANY, DEFENDANT.

IN EQUITY No. 11.

REPLICATION.

The replication of the above-named plaintiffs to the answer of the above-named defendant.

These replicants, saving and reserving to themselves all and all matter of advantage or exception which may be had and taken to the manifold errors, uncertainties, and insufficiencies of the answer of said defendant, for replication thereunto say that they do and will ever maintain and prove their said bill to be true, certain, and sufficient in the law to be answered unto by said defendant, and that the answer of said defendant is very uncertain, evasive, and insufficient in the law to be replied unto by these replicants; without this, that any other matter or thing in the said answer contained material or effectual in the law to be replied unto, confessed, or avoided, traversed, or denied, is true; all which matters and things these replicants are ready to aver, maintain, and prove as this Honorable Court shall direct, and humbly as in and by their said bill they have already prayed.

HENRY C. TOWNSEND,
Solicitor for Complainants.

DEFENDANT'S EXHIBIT NO. 49 DYER PHOTOGRAPHS A-1 TO A-6—NOT REPRODUCED.

DEFENDANT'S EXHIBIT No. 50, DYER PHOTOGRAPHS B-1 TO B-14—NOT REPRODUCED

DEFENDANT'S EXHIBIT NO. 51, DYER PHOTOGRAPHS C-1 TO C-8—NOT REPRODUCED.

DEFENDANT'S EXHIBIT AGREEMENT OF AUG. 3, 1912, BETWEEN THOMSON ELEC. WELD. CO. AND AMERICAN ELEC. WELD. CO.

AGREEMENT made this third (3rd) day of August, 1912, between the THOMSON ELECTRIC WELDING CO., a corporation organized and existing under the laws of the State of Massachusetts, and having its usual place of business in Lynn, in the Commonwealth of Massachusetts, party of the first part, hereinafter called the Thomson Co., and the AMERICAN ELECTRIC WELDING CO., a corporation organized and existing under the laws of the State of New York, part of the second part, hereinafter called the American Co.,

WITNESSETH:

WHEREAS the Thomson Co., is the owner of the following U. S. Letters patent and applications for U. S. Letters Patent, to wit:

Patents.

No. 928,701 to A. F. Rietzel dated July 20, 1909.
No. 973,586 to E. Thomson " Oct. 25, 1910.
No. 985,838 to A. F. Rietzel " Mar. 7, 1911.
No. 1,001,828 to A. F. Rietzel " Aug. 29, 1911.
No. 1,002,759 to A. F. Rietzel " Sep. 5, 1911.
No. 1,005,880 to A. F. Rietzel " Oct. 17, 1911.
No. 1,020,056 to A. F. Rietzel " Mar. 12, 1912.

Applications.

No. 337,136 of A. F. Rietzel filed.
No. 349,547 of A. F. Rietzel filed.
No. 426,959 of A. F. Rietzel "
No. 342,456 of A. F. Rietzel "
No. 459,601 of A. F. Rietzel "
No. 523,766 of E. Thomson "

and is also the owner of other inventions, U. S. Patents, and applications for U. S. Patents pertaining to the welding of metal plates over their plane surfaces by electricity, the union being affected in spots by the passage of the current from plate to plate, including machines and processes used in said electric welding, and the product of said processes; and

WHEREAS the Thomson Electric Welding Co., a corporation organized and existing under the laws of the State of Maine, the predecessor of the Thomson Co., party of the first part hereto, entered into agreements with the Standard Pulley Mfg. Co., a corporation organized and existing under the laws of the State of New York, respectively dated March 15, 1905, Nov. 3, 1905, and Nov. 27, 1905, by which the said Standard Pulley Mfg. Co. ac-

quired certain rights under the inventions, patents, and applications for patents of the predecessor of the Thomson Company; and

WHEREAS, by an agreement dated Feb. 24, 1906, the said Standard Pulley Mfg. Co. sold, assigned and transferred to the American Co., the party of the second part hereto, the full and exclusive rights acquired by it under the said agreements with the predecessor of the Thomson Co., respectively dated March 15, 1905, November 3, 1905 and November 27, 1905, so far as the same relate to metal cooking utensils, metal hollow and table ware, metal house ware, metal cans, and articles of a similar character, or to electric welding machines or parts thereof, to be used in the manufacture of such ware and articles, together with other rights set forth in said agreement of February 24, 1906; and

WHEREAS the predecessor of the Thomson Co., the American Co., and the said Standard Pulley Mfg. Co. entered into an agreement on March 14, 1906, wherein the predecessor of the Thomson Co. consented to and ratified the said assignment and transfer of February 24, 1906, from the said Standard Pulley Mfg. Co. to the party of the second part hereto; and

WHEREAS by an agreement dated March 20, 1906, the predecessor of the Thomson Co., party of the first part, pursuant to the provisions of the said agreement of March 14, 1906, granted to the American Co., party of the second part hereto, a certain lease or license under the inventions, United States patents, and applications for U. S. Letters Patent of said predecessor of the Thomson Company; and whereas said lease or license of March 20, 1906, was thereafter modified by agreements in writing between the predecessor of the Thomson Co. and the American Co., dated respectively September , 1906 and April 11, 1908; and

WHEREAS the parties hereto desire to modify the said Lease and License in certain respects:

NOW, THEREFORE, FOR AND IN CONSIDERATION OF THE sum of One Dollar ($1.00) by each to the other in hand paid, the receipt of which is hereby acknowledged, and in consideration of the premises, it is hereby agreed between the parties to these presents as follows:

First: The Thomson Co. hereby gives and grants unto the American Co., the exclusive right to use and to license others to use, the machines and processes described and covered in and by the above recited patents and applications for patents, or in and by any other U. S. Letters Patent that is now or may be hereafter acquired by the Thomson Co., pertaining to the welding of metal plates over their plane surfaces by electricity, the union being effected in spots by the passage of the current from plate to plate in the manufacture of metal cooking utensiles, metal hollow and table ware, metal house ware, metal cans, and articles of a similar character, whether tinned, galvanized or japanned, or finished in any other manner; also the exclusive right to make, use and sell, and to license others to make, use and sell, metal cooking utensiles, metal hollow and

table ware, metal house ware, metal cans, and articles of a similar character embodying the inventions, or any of them described and covered in and by the above recited patents and applications for patents, or any other patents that are now owned, or may be hereafter acquired by the Thomson Co., pertaining to the welding of metal plates over their metal surfaces by electricity, the union being effected in spots by the passage of the current from plate to plate, or to the articles produced by any such process, it being understood that the machines for manufacturing such ware shall be obtained and leased from the Thomson Co. under the terms and provisions of this agreement except as hereinafter provided.

Second: The Thomson Co. in consideration of one dollar ($1.00) to it paid by the American Co., the receipt whereof is hereby acknowledged, and of the covenants of the American Co. hereinafter contained, does hereby lease and let to the American Co. (subject, however, to the terms, and conditions of this lease), the machines heretofore furnished by the Thomson Co. or its predecessor, to the American Co. under the previous contracts above mentioned, and the machines to be hereafter furnished by the Thomson Co. to the American Co. pursuant to the terms of this lease; and this lease shall continue in force until the expiration of all the Letters Patent of the United States, both of the Thomson Co. and of the American Co., and of L. S. Lachman, of the City of New York, also of Maurice Lachman of the City of New York, whether owned or controlled by any or all of the said parties, the inventions of which are or shall be embodied in said machines, or at any time involved in the use thereof, or embodied in the product thereof, unless this lease shall be sooner terminated by the fault of the American Co. in accordance with the provisions hereinafter contained; whereupon the possession of such machines shall immediately revest in and be restored to the Thomson Co.

Third: The American Co. shall purchase all of the welding machines used by it, or its sub-lessees under this license, from the Thomson Co., except as hereinafter provided, and the Thomson Co. agrees to supply said machines as soon as possible upon request, and when supplied, said machines shall be subject to all the conditions and covenants of this lease.

Fourth: As soon as any such machine has been delivered by the Thomson Co. to the American Co., or its sub-lessee, the American Co. shall pay to the Thomson Co. for the said machine an amount equal to the cost to the Thomson Co. to produce the machine in question, plus 15%, using every reasonable effort to produce such machine at the lowest possible cost to it. The American Co. shall also pay to the Thomson Co. on each such hand machine an annual rental or royalty of One Hundred Dollars ($100.00), and on each semi-automatic machine an annual rental or royalty of One Hundred Twenty-Five Dollars ($125.00), and on each automatic machine an annual rental or royalty of One Hundred Fifty Dollars ($150.00), the said annual rental to be paid to the Thomson Co. in quarterly installments, in January, April, July and October of each

and every year during the continuance of this lease. The first quarterly payment on each such machine shall be computed pro rata from the date of its delivery by the Thomson Co. to the beginning of the following quarterly period.

Fifth: Said machines are leased only for the purpose of welding according to the method heretofore described, and for the purpose of welding articles heretofore described, and the American Co. agrees not to use, nor to permit others to use, said machines in any other way or for any other purpose.

Sixth: Said machines may be used by the American Co. in any locality in the United States, and the American Co. may sub-lease and let any and all of said machines to any party or parties within the United States it deems fit, but said machines shall, nevertheless, be subject to all the conditions and covenants of this lease when sub-leased and let, the same as if they were used by the American Co. itself.

Seventh: The American Co. shall not add to, or subtract from, said welding machines, any mechanism whatever now or hereafter organized or connected therewith by the Thomson Co., nor allow to be made any change or alteration in same, without the consent and authority in writing of the Thomson Co.; the Thomson Co. and its agents may at all reasonable times have convenient access to said machines to examine and inspect the same and the use thereof, and to alter or improve the same, as herein contemplated, as it shall see fit.

Eighth: The American Co. covenants and agrees never at any time during the terms of the said Letters Patent above referred to, or any of them, to violate or infringe said patents under which the American Co. is hereby licensed, or any of them nor ever to contest or question the validity of the same, or the sufficiency of their specifications, or the Thomson Co.'s title thereto.

Ninth: It is also agreed that the American Co. shall at any time have the right, upon six months' notice in writing of its intention so to do, to surrender any machine, and, upon the surrender of such machine and the payment to the Thomson Co. of all sums due as original payment and continuing rental or royalty to the day of the expiration of the said notice, said machine shall be released from this instrument, and the American Co. shall not be required to pay any further continuing rental or royalty upon any machine so surrendered; on the surrender of all the machines subject to this instrument, the American Co. not being in default in any of its provisions, this lease shall be cancelled, and all the further obligations of the parties hereto cease and determine.

Tenth: It is further agreed that, if the American Co. shall have fully complied with the terms and conditions herein set forth, and not otherwise, then upon the expiration of all the Letters Patent of the United States, owned or controlled by both the Thomson Co. and the American Co., and by said L. S. Lachman and said Maurice Lachman, the inventions of which shall at any time be embodied

in said machines or involved in the use thereof, the American Co. shall have the privilege of purchasing said machines upon the payment therefor of One Dollar ($1.00), and upon such purchase the Thomson Co. will transfer the property in said machines to said American Co. by a proper bill of sale.

Eleventh: In case the American Co. neglects or refuses to perform and observe any or all of the agreements, terms, or conditions in this lease contained, the Thomson Co. shall have the right to terminate the same by giving to the American Co. fifteen days' notice in writing of its intention so to do, and if the American Co. fails to repair and make good such default or defaults, on account of which the notice was given, on or before the expiration of said fifteen days, this lease, and all the rights of the American Co. hereunder, shall be wholly at an end, and the Thomson Co. released from all its obligations herein contained, but the American Co. shall not thereby be released from the liability to pay the rentals or royalties at the rate aforesaid already accrued at the termination of the lease, nor from the American Co.'s covenant in Clause "Eighth" hereof. Upon the termination of this lease in any of the contingencies aforesaid, said machines shall be released and discharged from this lease, and the possession thereof shall immediately revest in and be restored to the Thomson Co. who, by itself or its agents, may enter the premises of the American Co. or the sub-lessee, and all persons claiming under it, and may take or remove the machines without being deemed guilty of any trespass or tort; or the Thomson Co. may pursue the appropriate remedy at law or in equity against the American Co., any sub-lessee, or the persons in whom the machines, or any parts thereof, may be found. And on the termination of the said lease upon either or any of the events or contingencies aforesaid, the American Co. shall have no claim or right to the repayment by the Thomson Co. of the whole or any part of the sums which the American Co. may have paid as an original payment, or as royalties or otherwise, under this agreement, or as consideration for the execution of the same.

Twelfth: In case any of the said machines be subleased by the American Co. by an instrument in writing, which shall reserve practically similar security to the American Co., in relation to such machine or machines, as is reserved to the Thomson Co. by this agreement, and such sub-lessee shall neglect or refuse to perform and observe any of the provisions, terms or conditions in said sub-lease to it contained in relation to any machine so sub-let, or the sub-lessee shall fail to repair and make good such default within fifteen (15) days after written notice thereof is given to the American Co. by the Thomson Co., then in every such event the provisions of the preceding article of this agreement (Article No. Eleventh) are not to be operative or apply, provided, however, that the American Co. shall promptly thereafter exercise its right to terminate the sub-lease and use every reasonable effort, by way of legal proceedings or otherwise, and shall spare no reasonable ex-

pense, to recover the possession of the machine or machines so held under such sub-lease.

Thirteenth: It is agreed by the American Co. that it will do everything reasonably within its power to persuade its sub-lessees under this agreement to use welding machines furnished by the Thomson Co. in the manufacture of the ware heretofore specified. But it is agreed between the parties hereto that if any party is now using electric welding machines in the manufacture of the above specified ware, which machines were not obtained from the Thomson Co., or its predecessor, the American Co. shall have the right to license the said party to use the said machines under the patents and applications for patents hereinbefore referred to, for the purpose of manufacturing the kinds of ware above specified, and to use and sell the ware so manufactured, provided that the American Co. shall pay to the Thomson Co. an annual rental or royalty of one hundred dollars ($100.00) on each hand machine, and an annual rental or royalty of One Hundred Twenty-Five Dollars ($125.00) on each semi-automatic machine, and an annual rental or royalty of One Hundred Fifty Dollars ($150.00) on each automatic machine, so licensed, as specified in the Clause "Fourth" hereof, so long as such license remains in force; which payments said American Co. agrees to make.

Fourteenth: All the rights, interests and remedies vested in the Thomson Co. under this instrument, and also all those which belong to it by reason of ownership of said machines now or hereafter embraced in or made subject to the terms of this agreement, shall be deemed to belong to and be enforcible by the successors and assigns of the Thomson Co., and in their own name respectively.

IN WITNESS WHEREOF the parties hereto have caused their names to be signed hereto, and their corporate seals to be affixed by their proper officers, thereunto duly authorized, the day and year first above written.

THOMSON ELECTRIC WELDING CO.

(Seal) By W. W. HODGES, *Sec'y & Treas.*

AMERICAN ELECTRIC WELDING CO. OF NEW YORK.

(Seal) By AARON HECHT, *Pres.*

State of Mass., County of Essex, ss:

On this tenth day of August, 1912, before me personally appeared W. W. Hodges, to me known and known to me to be the secretary and treasurer of the Thomson Electric Welding Co., one of the corporations named in and who executed the foregoing instrument, who being by me duly sworn, stated that he was the Secretary and Treasurer of the said corporation, that the seal affixed to the foregoing instrument was the seal of said corporation, and was affixed thereto by order of the Board of Directors of the said corporation and that he subscribed his name thereto as said Secretary and Treasurer by the like order.

H. MORRIS KELLEY,
Notary Public.

State of New York, County of New York:

On this 20th day of August, 1912, before me personally appeared Aaron Hecht, to me known and known to me to be the President of the American Electric Welding Co., one of the corporations named in and who executed the foregoing instrument, who being by me duly sworn, stated that he was the President of the said corporation, that the seal affixed to the foregoing instrument was the seal of said corporation, and was affixed thereto by order of the Board of Directors of the said corporation, and that he subscribed his name thereto as President by the like order.

EDWIN SEGER,
Notary Public for Kings County.
Certificate filed in New York County.
Commission expires March 30, 1913.

(Seal)

(N. E. F.)

DEFENDANT'S EXHIBIT AGREEMENT OF JUNE 10, 1914, BETWEEN THOMSON ELEC. WELDING CO, AND AMERICAN ELEC. WELD. CO.

AGREEMENT.

This agreement made in triplicate this (tenth) day of (June), 1914, by and between the Thomson Electric Welding Company, a corporation organized and existing under the laws of the State of Mass., and having its principal place of business at Lynn, in the Commonwealth of Massachusetts, hereinafter called *Thomson Company*, and the American Electric Welding Company, a corporation organized and existing under the laws of the State of New York, hereinafter called *American Company*, parties of the first part, and the National Enameling & Stamping Co., a corporation organized and existing under the laws of the State of New Jersey, and carrying on business in the City, County and State of New York, hereinafter called *National Company*, party of the second part. Witnesseth:

Whereas Thomson Company and American Company entered into an agreement on August 3, 1912 whereby American Company obtained a certain exclusive license from Thomson Company under all the patents of the United States that it then owned or might thereafter acquire pertaining to the welding of metal plates over their plane surfaces by electricity, the union being effected in spots by the passage of the current from plate to plate, or to articles produced by such process, to use and to license others to use the machines and processes of said patents in the manufacture of metal cooking utensils, metal hollow and table ware, metal house ware, metal cans and articles of similar character, whether tinned, galvanized or japanned, or finished in any other manner, and to make, use and sell and to license to others to make, use and sell metal cooking utensils, metal hollow and table ware, metal house ware, metal cans and articles of a similar character embodying the inventions, or any of them, described and covered in and by said patents; and

Whereas National Company and Eisenhutte Silesia Aktien Gesselschaft, a corporation organized and existing under the laws of Germany, hereinafter called Silesia Company, entered into an agreement on the 31st day of December, 1904, by which agreement National Company was to obtain from Silesia Company certain rights with relation to an invention of Johann Harmatta for which an application for Letters Patent of the United States had been filed on December 3, 1903, Serial No. 183,677, upon which application Letters Patent of the United States No. 1,046,066 were granted on December 3, 1912 to Thomson Company as assignee of said Harmatta; and

Whereas Thomson Company and Silesia Company entered into an agreement on April 3rd, 1912 whereby Silesia Company, representing that it owned or controlled the said Harmatta application, agreed to cause the same to be assigned to the Thomson Company and also to assign to Thomson Company all its rights under its said agreement with National Company; and

Whereas Thomson Company and American Company have heretofore asserted and now assert that the said agreement between National Company and Silesia Company is null and void, whereas National Company has asserted that said agreement is good and valid; and

Whereas it is the desire of Thomson Company and American Company that American Company acquire all rights, if any, that National Company may have in and under said Harmatta patent, including all rights it may have to sue and recover for past infringement of said Harmatta patent and National Company desires to obtain a certain release and license under this and other patents as hereinafter more particularly specified.

Now, Therefore, for and in consideration of the premises and in further consideration of the mutual benefits and advantages accruing to the parties hereto by reason of the covenants and conditions of this agreement, it is mutually agreed as follows:

1. The aforesaid agreement between the National Company and Silesia Company is hereby cancelled by mutual consent and the same shall be without force and effect hereafter for any purpose and all rights that National Company may have had under said agreement, including the right to sue for and recover profits and damages or other recoveries from any infringers of said Harmatta Patent, are hereby assigned and transferred and set over to American Company and its successors and assigns.

2. Thomson Company and American Company hereby grant and each of them hereby grants to National Company a full and complete release from any claim that they or either of them may have against National Company for the infringement of any letters patent of the United States pertaining to the welding of metal plates over their plane surfaces by electricity, the union being effected in spots by the passage of the current from plate to plate, or against the customers of National Company by reason of their use or sale of articles obtained from National Company, and the said Thomson Company and American Company hereby grant and each of them hereby grants to the National Company a full and complete release from any and all claims, demands and causes of action arising out of, or which but for the covenants herein contained might at any time hereafter accrue under, the aforesaid contract between Silesia Company and National Company in favor of Silesia Company, its successors and assigns, against National Company.

3. American Company and Thomson Company, and each of them, hereby grants to and confers upon National Company, and its successors in business, a non-transferable license, under all pat-

ents pertaining to the welding of metal plates over their plane surfaces by electricity, the union being effected in spots by the passage of the current from plate to plate, owned or controlled in whole or in part by Thomson Company and American Company, both or either of them, or under which American Company, is licensed, including all patents referred to in the aforesaid agreement between Thomson Company and American Company, dated August 3, 1912, and under all other patents relating to the aforesaid art heretofore or hereafter acquired or controlled by them or either of them in whole or in part, including all patents for improvements on the inventions covered by any of the patents hereinbefore referred to, to use any patented machines, including those which the National Company now has in use, covered by such patents or any of them, and to use any patented process or processes covered by the said patents or any of them, in the several factories of National Company, including any factories hereafter acquired by it, in the manufacture of its metal cooking utensils, metal hollow and table ware, metal house ware, metal cans and articles of a similar character whether tinned, galvanized or japanned, or finished in any other manner, and to make or have made for it said patented machines for said use, and to make, use and sell said utensils, wares, cans and articles, the license hereby granted to and conferred upon National Company to continue to the full end of the term of all the patents hereinbefore referred to under which this license is granted, and of any extensions thereof.

4. And said Thomson Company and American Company hereby grant and each of them hereby grants to and confers upon National Company, a non-transferable license under the aforesaid Harmatta patent for the full term of said patent or any extensions thereof, to make, use or have made for it any machine covered by said patent, and to use the process covered thereby in the several factories of National Company, including those that may be hereafter acquired by it, for the manufacture of any products whatsoever of National Company, and to make, use and sell said products. The aforesaid license from Thomson Company for the manufacture and sale by National Company under the Harmatta patent of any products other than metal cooking utensils, metal hollow and table ware, metal house ware, metal cans and articles of a similar nature, whether tinned, galvanized or japanned, or finished in any other manner, is, however, subject to the rights heretofore granted by Thomson Company to the Universal Electric Welding Company.

5. No royalty shall be paid by National Company to Thomson Company and American Company or to either of them, or to the respective successors or assigns of either of them, for or in consideration of the license hereby granted; nor shall National Company be required to pay to said Thomson Company and American Company, or to either of them, or to the successors or assigns of either of them, any consideration whatsoever other than that speci-

fied in the first paragraph hereof, for any right, license or benefit granted to, conferred upon or acquired by National Company hereunder.

IN WITNESS WHEREOF, the parties hereto have duly executed this instrument by the hands of their respective offices, thereunto duly authorized, and have caused their respective corporate seals to be attached thereto.

THOMSON ELECTRIC WELDING CO.,
W. W.
By H. H. HODGES, *Treasurer.*
AMERICAN ELECTRIC WELDING CO.,
By AARON HECHT, *President.*
NATIONAL ENAMELING & STAMPING CO.,
By F. A. W. KIECKHOFER, *President.*

State of Massachusetts, County of Suffolk, ss:

On this (11th) day of (June) 1914, before me personally appeared (W. W. Hodges) to me known and known to me to be the (treasurer) of the Thomson Electric Welding Company, the corporation named in and which executed the foregoing instrument, who being by me duly sworn, stated that he was the (treasurer) of the said corporation, that the seal affixed to the foregoing instrument was the seal of said corporation, and that he was duly authorized to affix said seal to said instrument, for the purpose therein stated, and that he subscribed his name thereto as said (treasurer), by like authority.

HARRISON F. LYMAN,
Notary Public.

State of New York, County of New York, ss:

On this (10) day of (June), 1914, before me personally appeared (Aaron Hecht) to me known and known to me to be the (President) of the American Electric Welding Company, the corporation named in and which executed the foregoing instrument, who being by me duly sworn, stated that he was the (President) of the said corporation, that the seal affixed to the foregoing instrument was the seal of said corporation, that he was duly authorized to affix said seal to said instrument for the purpose therein stated, and that he subscribed his name thereto, as said (President), by like authority.

ALBERT FAHNER,
Notary Public # 1052, *New York County.*

State of New York, County of New York, ss:

On this (10th) day of (June,) 1914, before me personally appeared (F. A. W. Kieckhofer) to me known and known to me to be the (President) of the National Enameling & Stamping Co., the corporation named in and which executed the foregoing instrument, who being by me duly sworn, stated that he was the (President)

of the said corporation, that the seal affixed to the foregoing instrument was the seal of said corporation, that he was duly authorized to affix said seal to said instrument for the purpose therein stated, and that he subscribed his name thereto as said (President), by like authority.

WM. E. FORD,
Notary Public No. 100, *Kings County, N. Y.*
Certificate filed in New York County
(No. 22)
My Commission expires March 30, 1915.

(N. E. F.)

DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF MICHIGAN,
SOUTHERN DIVISION.

THOMSON SPOT WELDER COMPANY,
Plaintiff,
v.
FORD MOTOR COMPANY,
Defendant.

In Equity
On Harmatta Patent
No.1,046,066.

DEFENDANT'S EXHIBIT A-1.

May 7,1918.

Feb. 28, 1917.

Mr. J. H. Garvell,
American Chemical Paint Co.,
Philadelphia, Pa.

My dear Sir:

The committee of which I have the honor of being Chairman has accumulated some very important legal opinions regarding the validity of the Harmatta spot welding patent.

The committee has in its possession an original spot welder used in 1901, and also affidavits of a number who have worked and used the machine, saying nothing of a large volume of important matters bearing on the subject, - all of which is open to the inspection of those users of electric welding machines that come to contribute to the further work now in progress.

One of our members, Mr. Robert A. Brannigan, Manager of Patent Department, National Automobile Chamber of Commerce has given in your name, with the remarks that he understands that you have in your possession valuable information in connection with the spot welding patents. The writer will be very glad, indeed, to exchange information, and sincerely hopes that you may write him, outlining your position in the matter.

Under this cover I am handing you the form letter which we are sending out, together with application blank for contribution, and an extract from the minutes of our meeting on the 21st.

Very respectfully yours,

Chairman.

HAM:MVL

2032

DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

THOMSON SPOT WELDER COMPANY,
Plaintiff.
vs.
FORD MOTOR COMPANY

In Equity
On Harmatta Patent
No.1,046,066.

DEFENDANT'S EXHIBIT A-1.
May 7, 1918.

Feb. 28, 1917.

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Philadelphia, Pa.

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One of our members, Mr. Robert A. Brannigan, Manager of Patent Department, National Automobile Chamber of Commerce has given in your name, with the remark that he understands that you have in your possession valuable information in connection with the spot welding patents. The writer will be very glad, indeed, to exchange information, and sincerely hopes that you may write him, outlining your position in the matter.

Under this cover I am handing you the form letter which we are sending out, together with application blank for contribution, and an extract from the minutes of our meeting on the 21st.

Very respectfully yours,

Chairman.

RBB:MFL

2053

AMERICAN CHEMICAL PAINT COMPANY

B. C. TILGHMAN, PRESIDENT
H. E. TAYLOR, VICE PRESIDENT
J. H. GRAVELL, TREASURER
C. B. SHOWELL, SECRETARY

PROCESSES AND MATERIALS FOR
PREPARING METALS FOR PAINTING

BRANCH OFFICE
KERR BUILDING
DETROIT, MICH.
DUCOMB, REP.

GENERAL OFFICES AND WORKS
1118-26 S. 11TH STS.

PHILADELPHIA, PA. March 2, 1917.

DIST. CT. OF THE U. S.
E. DIST. OF MICHIGAN
SOUTHERN DIVISION
THOMSON SPOT WELDER CO., Plaintiff
v.
May 7, 1918. FORD MOTOR COMPANY, Defendant.
In Equity on Harmatta Patent #1046066.

DEFENDANT'S EXHIBIT A-2.

The Welding Patents Investigating Committee,
Room 700 Henkert Bldg.,
Canton, Ohio.

Gentlemen:-

I have your letter of February 28th and in reply beg to advise that Mr. R. S. Carrick a representative of Mr. Lee of Chicago, who was present at the Canton Meeting, called on me the day before yesterday.

I explained to Mr. Carrick in great length my position in the matter and what I thought would be necessary to win a suit. Mr. Carrick will transmit my ideas in person to Mr. Lee in Chicago, who will in turn take the matter up with you.

Thanking you for keeping me posted in these matters, I beg to remain

Very respectfully yours,

American Chemical Paint Company,

JHG/HS

J. H. Gravell

Was Met to Make Settlement

MAR 5 1917

2034

AMERICAN CHEMICAL PAINT COMPANY

B.C. TILGHMAN, PRESIDENT
H. E. TAYLOR, VICE PRESIDENT
J. H. GRAVELL, TREASURER
C. B. SHOWELL, SECRETARY

PROCESSES AND MATERIALS FOR
PREPARING METALS
FOR PAINTING

BRANCH OFFICE
KERR BUILDING
DETROIT, MICH.
W. C. DU COMB, REP.

GENERAL OFFICES AND WORKS
1118-26 S. 11TH STS.
PHILADELPHIA, PA. March 9, 1917.

W.F.S.
S.P.Sx.
May 7,1918.

DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION.
THOMSON SPOT WELDER CO., Plaintiff,
v.
FORD MOTOR COMPANY, Defendant.
In Equity on Harmatta Patent No.1,046,068

DEFENDANT'S EXHIBIT A-3.

Mr. H. C. Mulligan, Chairman
The Welding Patents Investigation Committe
Room 700 Henkert Bldg.,
Canton, Ohio.

Dear Sir:-

We were represented at the Canton meeting by our Mr. J. H. Gravell and take pleasure in enclosing our check for $10.00 as our subscription to your committee.

Our Mr. J. H. Gravell can no doubt be of considerable assistance to you and we believe he is now intouch with Mr. Lee of Chicago, relative to this matter.

Very truly yours,

American Chemical Paint Co.,

B.C. Tilghman Pres.

JHG/HS

2025

DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF MICHIGAN.
SOUTHERN DIVISION.
THOMSON SPOT WELDER COMPANY, Plaintiff,
v.
FORD MOTOR COMPANY, Defendant.
In Equity on Harmatta Patent No.1,046,066.

DEFENDANT'S EXHIBIT A-4.

May 7, 1918.

March 13, 1917.

Mr. B.C. Tilghman, Pres.,
American Chemical Paint Co.,
Philadelphia, Penn.

Dear Sir:-

In behalf of the Welding Patents Investigating Committee, we wish to thank you for your contribution of $10.00, and attach hereto receipt.

We thank you for your information relative to Mr. Gravell.

Yours very truly,

Chairman.

AMERICAN CHEMICAL PAINT COMPANY

B. C. TILGHMAN, PRESIDENT
H. E. TAYLOR, VICE PRESIDENT
J. H. GRAVELL, TREASURER
C. B. SHOWELL, SECRETARY

PROCESSES AND MATERIALS FOR
PREPARING METALS FOR PAINTING

BRANCH OFFICE
KERR BUILDING
DETROIT, MICH.
W. C. DU COMB, REP.

GENERAL OFFICES AND WORKS
1118-26 S. 11TH STS.
PHILADELPHIA, PA.

DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION
THOMSON SPOT WELDER COMPANY, Plaintiff
v.
FORD MOTOR COMPANY, Defendant.
In Equity on Harmatta Patent No. 1,046,066.

DEFENDANT'S EXHIBIT A-5.

May 7, 1918.

May 22, 1917.

The Welding Patents Investigating Committee,
700 Reinhart Bldg.,
Canton, O.

Gentlemen:-

Enclosed please find our check for $20.00 in accordance with your last communication, as we have one spot welding machine in this office.

Very truly yours,

American Chemical Paint Co.

B. C. Tilghman Pres.

BCT/HS

Enc.

2037

DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION.
THOMSON SPOT WELDER COMPANY, Plaintiff,
v.
FORD MOTOR COMPANY, Defendant.
In Equity on Harmatta Patent No.1,046,066.
DEFENDANT'S EXHIBIT A-C.

May 28, 1917.

May 7,1918.

American Chemical Paint Co.,
1126 South Eleventh St.,
Philadelphia, Pa.

Gentlemen:-

In acknowledging receipt of your check for Twenty ($20.00) Dollars, on the basis of $20.00 per machine, the Committee wishes to express their appreciation of your hearty co-operation and enclosed herewith please find receipt for above amount.

Yours very truly,

Chairman,

Per Rec.Sec.

2038

AMERICAN CHEMICAL PAINT COMPANY

B. C. TILGHMAN, PRESIDENT
H. E. TAYLOR, VICE PRESIDENT
J. H. GRAVELL, TREASURER
C. B. SHOWELL, SECRETARY

PROCESSES AND MATERIALS FOR
PREPARING METALS
FOR PAINTING

BRANCH OFFICE
KEDR BUILDING
DETROIT, MICH.
W. C. DU COMB, REP.

GENERAL OFFICES AND WORKS
1118-26 S. 11TH STS.
PHILADELPHIA, PA.

DIST.CT. OF THE U.S.
E. DIST. OF MICHIGAN
S. DIVISION.
THOMSON SPOT WELDER COMPANY, Plaintiff, v.
FORD MOTOR COMPANY, Defendant.

October 22nd, 1917.

In Eq.on Harmatta Patent No.1,046,066.

May 7,1918.

DEFENDANT'S EXHIBIT A-7.

The Welding Patents Investigation Committee,
Canton, Ohio.

Gentlemen:-

We have your communication of October 18th, and beg to advise that we expect to have a representative at your meeting.

Very truly yours,

American Chemical Paint Co.

HS

F. Schuko-aft

2079

AMERICAN CHEMICAL PAINT COMPANY

R. C. TILGHMAN, PRESIDENT
H. E. TAYLOR, VICE PRESIDENT
J. H. GRAVELL, TREASURER
C. SHOWELL, SECRETARY

PROCESSES AND MATERIALS FOR
PREPARING METALS FOR PAINTING

GENERAL OFFICES AND WORKS
1118-26 S. 11TH STS
PHILADELPHIA, PA.

BRANCH OFFICE
KERR BUILDING
DETROIT, MICH.
W. C. DU COMB, REP.

RECEIVED SEP - 5 1917

ANSWERED SEP - 5 1917

September 1st, 1917.

May 7, 1918.

DISTRICT COURT OF THE U.S.
E. DISTRICT OF MICHIGAN
SOUTHERN DIVISION.
THOMSON SPOT WELDER CO., Plaf.
v.
FORD MOTOR COMPANY, Defendant
In Equity on Marmatte Patent #1,046,0[illegible]

DEFENDANT'S EXHIBIT No[illegible]

The Federal Machine & Welder Co.
140 S. Dearborn St.
Chicago, Ill.

Attention H. N. Lounsbury

Gentlemen :-

Believing it is well to help along the cause we have filled in the subscription blank for $250.00 representing as we understand it one share of stock and the balance in bonds, and are enclosing our check for $10.00 being 10% of the subscribed stock.

We understand the balance of the stock is to be paid for on request of the Board of Directors and that the bond will be paid for at the time of the tender of said bond.

Very truly yours,

American Chemical Paint Co.

H. Schukraft

Enc.

Subscription letter
PRS

2040

DISTRICT COURT OF THE U. S.
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION.
THOMSON SPOT WELDER COMPANY, Plaintiff
v.
FORD MOTOR COMPANY, Defendant.
In Equity on Marmatta Patent No.1,046,666.

DEFENDANT'S EXHIBIT A-9.

May 7,1918.

September 5, 1917

American Chemical Paint Co.,
1118 S. 11th Street,
Philadelphia, Pa.

Gentlemen: Attention Mr. H. Schuerruff

I am in receipt of your favor of the 1st instant, enclosing subscription in the amount of $250.00 to the Federal Machine & Welder Company, together with check for $10.00.

As there seems to be some question over the status of your Mr. Gravell with reference to the spot welder controversy, and as to whether your company is a bona fide owner and user of welding machines, it has been decided not to accept your subscription, at least until this matter can be cleared up.

I, therefore, return your subscription blank and check.

Yours very truly.

ERL:MK

Chairman Committee on Organization

2011

A.F.RIETZEL
THOMSON SPOT WELDER COMPANY
vs.
FORD MOTOR COMPANY
Defendant's Exhibit
Rietzel Sketch

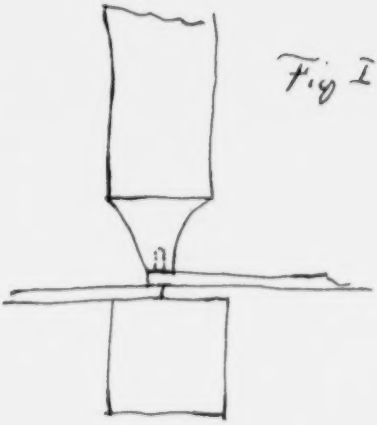


Fig 1

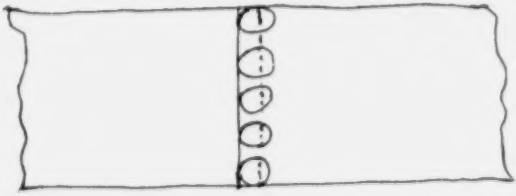


Fig 2.

Defendant's Exhibit No. 52

2042

No 52

Dominion of Canada.

PATENT OFFICE.

Certified to be a true and correct copy of original Application for Patent number 108990, filed December 1st, 1908, by Johann Harmatta, for "Electric Welding."

In Witness the seal of the Patent Office hereto affixed at the City of Ottawa in the Dominion of Canada this 28th day of April in the year of our Lord one thousand nine hundred and nineteen.

for Deputy Minister of Patents

Serial No. 108,990. Filed Dec. 1, 1903. Subject: Electric Welding. Case 1. Inventor, Johann Harmatta. 1st Report, 1241-14-4-04. 2nd Report, 1430-25-2-05. 3rd Report, 7 Jan. 11, 1906. 4th Report, 316, 26/xl., 1906. Abandoned, Nov. 30, 1907.

F. D. WITHROW,
Examiner.

CASE I.

Patent Office, Canada, Dec. 1, 1903.

APPLICATION FOR CANADIAN PATENT.

Petition with Power of Attorney.

To the Commissioner of Patents,
Ottawa.

The petition of Johann Harmatta, Engineer, a subject of the King of Hungary, residing at Szepesváralja, in the Kingdom of Hungary, showeth:

That he has invented new and useful "Improvements in Electric Welding," not known or used by others before his invention thereof, and not being in public use or on sale, with his consent or allowance as such inventor for more than one year previous to his application for a patent therefor, in Canada.

Your petitioner, therefore, prays that a patent may be granted to him for the said invention, as set forth in the specification in duplicate relating thereto, and for the purpose of the Patent Act, your petitioner elects his domicile in the City of Montreal, Province of Quebec.

Your petitioner hereby appoints Messrs. Marion & Marion, of Montreal, Province of Quebec, his attorneys with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign the drawings, to receive the patent, and to transact all business in the Patent Office connected therewith.

Signed at Budapest, this 5th day of November, 1903.

JOHANN HARMATTA.

Witnesses:
DR. ALEXANDER KAUFFMANEY.
CARL BEIKER.

DECLARATION.

I, Johann Harmatta, Engineer, a subject of the King of Hungary, residing at Szepesváralja in the Kingdom of Hungary, declare and say that I verily believe that I am the inventor of the new and useful "Improvements in Electric Welding," described

and claimed in the specification relating thereto and for which I solicit a patent by my petition dated fifth day of November, 1903, and I further say that the same has not been patented to me, or to others with my knowledge or consent in any country, and I further say that the several allegations contained in the said petition are respectively true and correct.

JOHANN HARMATTA.

Declared before me at Budapest, this 5th day of November, 1903.

J. DRULET,
His Britannic Majesty's Consul,
Budapest.

Stamp.

SPECIFICATION.

E. M. D., M. F. S.

To All Whom It May Concern:

Be it known that I, JOHANN HARMATTA, Engineer, a Subject of the King of Hungary, residing at Szepesváralja, in the Kingdom of Hungary, have invented new and useful "IMPROVEMENTS IN PROCESSES OF ELECTRIC WELDING" and I do hereby declare that the following is a full, clear and exact description of the same.

The subject of my invention is a process of welding thin sheet metal by means of electricity.

As is well known it is impossible, by means of the ordinary methods of electric welding, to produce a really sound seam between very thin metal sheets, from about two millimeters in thickness downward, that is to say, a seam which is perfect at every part, without there being any fusing or burning away of the material being welded.

C The reason of this I have ascertained to be as follows:

On the ordinary systems of welding it is the practice at once to lead a current to the objects to be welded (such as iron bars, hoops, chain links, or the like) whereby, in consequence of the thinner or thicker layer of air, which is always present between the two objects, vigorous sparking occurs. There is, so to say, a line of sparks or an arc formed, which persists until the objects being welded have been brought to welding heat by the electric current, whereupon they are finally pressed together to effect the desired union.

This well-known method, therefore, does not really differ from the ordinary method of welding at the fire, except that instead of the gases of combustion of the fuel, the electric current is employed to heat the bodies to be welded. Once the welding heat is reached, however, the final union of the bodies in either case is effected by mechanical pressure (pressing or hammering).

Amendment Filed with letter Jul. 9/04.

For the purpose of enabling my invention to be more readily understood, I will make reference to the accompanying drawing, in which

Fig. 1 is a sectional view illustrating the electric welding of two comparatively thick sheets on the ordinary system.

Fig. 2 is a like view showing what occurs when one of the sheets is thin.

B. Fig. 3 is a section of portions of two thin sheets with an air-gap between them.

Fig. 4 is a sectional view illustrating the employment of my new process in welding thin sheets.

Fig. 5 is a like view showing the welding of the overlapping ends of two pieces of sheet metal.

As Fig. 1 shows, the electrodes *a b* lie opposite each other, the sheets *1*, *2* to be welded by the ordinary process being located between them. The sheets lie loosely upon each other, that is to, say they are not artificially pressed together, and the consequence is that they are separated by a layer of air 3.

If now the electric circuit is completed through the two electrodes and the sheets, and if the layer of air *3* is sufficiently thick, that is to say, the air resistance sufficiently great, there will be no sparks or arc formed between the two plates for the time being. If, however, the sheets are approached, as is unavoidable for the purpose of final union by pressing, hammering, etc., as already explained, a time must arrive when the air resistance between the two sheets to be welded is no longer sufficiently great to prevent equalization of the electricity at the two poles. Between the sheets, therefore, an arc or a line of sparks will be formed, and will continue until intimate contact has taken place between the two sheets. If, as is shown in Fig. 1, the sheets are relatively thick, the arc which is formed will be of no consequence, since the slight fusing away at *4* caused by the arc, or the sparks, will not be sufficiently deep to penetrate the thick material. In fact, there is even an advantage in the action of the sparks or arc in the case in question, since the cross section of the material is altered, whereby the two sheets are, as it were, scarfed at the place of welding, that is

B. to say, the two cross sections are diminished at the seam to approximately the thickness of a single sheet, so that under certain conditions the two welded sheets have the same thickness at the joint as a single sheet.

The case is altogether other when two thin sheets or articles are to be welded, or when a very thin object is to be welded to a thicker one, such as is shown, for instance, in Fig. 2. In this figure it is assumed that the thick sheet 2 (which, as explained with reference to Fig. 1 is thick enough not to be penetrated completely by the arc at the point 4) is to be electrically welded to a very thin plate 5 by the ordinary process as above explained.

On the approach of the objects *2*, *5*, at a certain moment, in consequence of the penetration of the layer of air *3*, fusing away takes

place at *4*, owing to the arcs or sparks, and this fusing will extend to such depth that, although, as above explained, not injurious in the case of the sheet 2, it causes the thin sheet 5 to be completely perforated or burnt through. Thus the ordinary process of welding by means of an arc is quite impracticable with thin sheets as represented in Figs. 2-5.

C. The essential feature of my invention is that in welding thin sheets from about two millimeters in thickness downward the formation of such an arc, or sparking distance, which proves so disastrous, is wholly avoided, whereby a perfectly sound welded joint between such bodies, or between a very thin body and a thicker object, is attained.

B. For the purpose of preventing the formation of the injurious arc, that is to say, the sparking distance, I first submit the superposed metal objects to be welded *5*, *6* (Figs. 4 and 5) to a certain pressure, the amount of which will depend upon the nature of the said objects. This pressure I effect by means of the electrodes *a b* (Figs. 4 and 5) themselves, or with the aid of other suitable means. The purpose of this pressure is to bring into intimate contact the parts of the metal to be united, so that the layer of air between them is as far as possible expelled. In this manner the two parts to be welded are, as it were, mechanically connected to form a single homogeneous body. This is of great importance when the two very thin sheets are to be welded together. For, as is well known, thin sheets have always a more or less wavy form, so far as they have not been straightened in the process of manufacture, so as to present a surface which is practically quite flat, such as is the case with thick sheets. Such thin sheets, therefore, unless submitted to mechanical pressure never lie close upon one another; on the contrary, in consequence of the waved form, large air-gaps 3 (Fig. 3) are left between them, so that if a current were led through them, it would aid sparking and the formation of arcs.

After the two metal objects have, therefore, been prepared in this way, that is to say, by the application of mechanical pressure caused to lie closely upon each other, without any air-gap, between them, the electric circuit is closed, the mechanical pressure being still maintained.

B. At the place where the electrodes *a b* exert pressure, therefore (Figs. 4 and 5), that is to say, where the current is able to flow through the bodies to be welded without having to pass through a layer of air and form sparks, the metal is heated to welding heat. Immediately this temperature is reached, the continuous pressure effects the desired union, that is to say, welding of the two metal objects 5 and 6, without injury by perforation or burning, in the manner explained, having taken place, even if the sheets are extremely thin. It should be remarked that the pressure to be exercised on the bodies before and during welding, must be

selected according to the thickness of the sheets, and can be adapted to suit the condition of the bodies for the time being. Thicker sheets or objects do not require so much pressure as thin ones because, as already explained, they have a more even, uniform shape and therefore when laid upon each other can be readily closed together, that is to say, pressed so that no injurious air-gap is formed.

Since the essential condition is, that the two metal objects to be united are firmly pressed together before welding, in order that complete penetration of the thin body by the electric current may be avoided, it is obvious that with this process not only two equally thin sheets, but a very thin sheet and a thicker metal object may be welded without danger of the former being burnt through.

Naturally the required superficial pressure may be exerted by only one electrode, or by both the electrodes.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:

The herein described process of electrically welding thin metallic sheets, which consists in applying electrodes on the metallic sheets at the point at which the joint is to be formed, then forcing the electrodes on the sheets sufficiently to press the same intimately together at the point at which they are to be welded, then heating the metallic sheets by passing an electric current through said electrodes and through the sheets, and maintaining the pressure of said electrodes on the sheets during the passage of the current through the electrodes and the sheets.

E.

Signed at Budapest, Hungary, this 5th day of November, 1903, in presence of two witnesses.

JOHANN HARMATTA.

DR. ALEXANDER KAUFFMANEY.
CARL BEIKER.

Patent Office, Canada, Dec. 1, 1903.

MARION & MARION,

Engineers and Patent Attorneys.
New York Life Building,
Montreal,
Nov. 30, 1903.

Hon. Commissioner of Patents,
Ottawa, Ont.

Sir,

Enclosed please find the sum of $20.00, being amount of government fees on application as follows:

Inventors	Title of Inventions	Amounts.	
Johann Harmatta	Electric Welding (Case I)	$20	

All documents in connection with above application are being sent you today under separate cover.

Very respectfully,
MARION & MARION,
Attorneys.

Department Agriculture, Dec. 1, 1903.

PATENT OFFICE, CANADA.

Received from Johann Harmatta
$20.00 No. 110,588.
Patent Fee.

F. C. CHITTICK, p.
Accountant.

Dominion of Canada,
Department of Agriculture,
Patent Office,
Ottawa, December 4, 1903.

All communications should be addressed to "The Commissioner of Patents," "Ottawa." When writing on this subject refer to No. 108,990.

Sir,

I am directed to acknowledge the receipt on the 1st instant of the Petition, Oath, Specifications and Drawings, applying for a Patent in favour of Johann Harmatta, for "Electric Welding" (Case 1) and to inform you that the application will be taken up for examination in its order.

I have the honour to be,
Sir,
Your obedient servant,

W. J. LYNCH,
Chief Clerk.

To Messrs. Marion & Marion,
Montreal, Que.

Patent Office,
Canada,
Ottawa, April 14, 1904.

Johann Harmatta, Esq., per Messrs. Marion & Marion, N. Y. Life Building, Montreal, Que.

Please find papers herewith enclosed, and below a communication from the Examiner in charge of your application, Serial No. 108,990 for Electric Welding.

GEO. F. O'HALLORAN,
Deputy Commissioner of Patents.

Claims for a process and for the apparatus used in the performance thereof must be presented in separate applications.

Reference is made to U. S. P. 347140 to Thomson—1886; 347141 same—375022—Thomson—1887.

Sgd. A. CAMPBELL.

Any communication respecting this application should give the serial number and should be addressed to "The Commissioner of Patents, Ottawa."

Patent Office, Canada, May 13, 1904.

MARION & MARION,

Patents and Patent Causes.
Montreal, Can., and Washington, D. C.,
U. S. A.
New York Life Building.
Montreal, May 10, 1904.

AMENDMENT.

In the Canadian Patent Office, Application of Johann Harmatta, Electric Welding, Serial No. 108,990, Filed December 1, 1903.

Defendant's Exhibit No. 52.

Hon. Commissioner of Patents,
Ottawa, Ont.

Sir:

We return herewith the duplicate specification and drawings amended. We also send you a second copy of the new specification with claims, and an extra copy of the new claims. We send also one drawing on cardboard of new figures 1 to 4 inclusive, and a copy on tracing cloth of these figures. We attach to the present letter a blue-print of the original drawings filed, where you will find A. that we have erased original figures 4 and 6 and re-numbered the other figures. The alterations to the original drawings are indicated in red on the blue-prints, and we hereby authorize and request the Patent Office to make similar corrections on the drawings retained.

It is hoped that the application as now amended will be found allowable, and an early issue of the patent is respectfully requested.

Respectfully submitted,

MARION & MARION,
Attorneys.

M./M.

To all whom it may Concern:

Be it known that I, Johann Harmatta, Engineer, a subject of the King of Hungary, residing at Szepesvaralja, in the Kingdom of Hungary, have invented new and useful "Improvements in Electric Welding," and I do hereby declare that the following is a full, clear and exact description of the same:

My invention relates to a process of and apparatus for manufacturing metal articles of all kinds, in particular those of the thinnest sheet metal, by direct electric welding. The new process consists in one of the electrodes (or both of them) not only serving to feed the current, but also being employed for exercising a more or less strong pressure either before and during the period of supplying the electric current, or only at the moment of this supply, at the place at which the welding is to be done. The member which feeds the electricity is thus at the same time the tool, and in this manner the most favorable conditions of working possible are secured, since, as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough.

According to none of the present known electric welding processes are the articles to be welded firmly pressed together during the welding operation by one or both electrodes, for the purpose of favoring welding. Hitherto either no pressure has been exerted at all, or it has been exercised at a certain distance from the place of welding, or at all events not centrally direct upon the electrodes pressing on the place to be heated. In short, hitherto direct electric welding pressure has never been exercised by means of the

electrodes located in the direction of the current directly above the surface or point being welded.

For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place suitable for producing or transmitting pressure; *e. g.*, with a press of welding by the aid of any of those technical means which are either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power.

In the accompanying drawing

Fig. 1 is a view illustrating the welding of two metal sheets of equal thickness, intermittently or at certain spots only.

Fig. 2 is a front elevation and

Fig. 3 a side elevation of a device which may be employed for continuous welding, the pressure being exerted by roller electrodes, whereby the advancing series of single points of the seam to be welded is united to a whole with a minimum consumption of current.

Fig. 4 illustrates the method of welding the longitudinal seam of a cylindrical or conical hollow article according to my new process.

Fig. 5 is a side elevation of a welding device (also illustrated in part in Fig. 1) according to which the pressure is exercised by pin shaped electrodes, the form of which may be suited to the particular purpose in view, and which may be adapted to work on the smallest possible surface of contact.

Fig. 6 shows two forms which may be adopted for the ends of the contacting electrodes.

As Fig. 1 shows, the two sheet metal or other bodies, the edges of which lie upon each other, are introduced between the two electrodes *a b*. Of the latter the one, somewhat prior to welding or only during the welding operation, is pressed upon the other, as the arrow shows; or both electrodes may be caused to exert pressure on the subjects to be welded.

For continuous welding of longitudinal, cross and circular seams, the device shown in Figs. 2 and 3 of the drawing may be advantageously employed.

In the two conductors *c d* (Fig. 3), forked members *e f*, making intimate contact with the conductors, are introduced, each furnished with a removable roller electrode *g* and *h*; or, if desired, only the lower roller electrode, for instance, may be capable of being removed. Or the lower or upper electrode may be formed as movable roller and the other electrode forms a stationary conductor.

The roller *g* of the upper conductor *c* is keyed to an axis *i* carrying a spur wheel *k* to which the motion of a suitably mounted hand-wheel *l* can be transmitted by means of a spur wheel *m*. Or the hand-wheel may be mounted directly on the shaft *g*, without the use of any intermediate gear-wheels. Or the axis *i* may have on the other end also a spur or bevel wheel, or pulley or the like for driving the roller electrode *g*, should it be desired to auto-

Cancelled by letter May 10/04

matically advance the object being welded by means of motor power. The purpose of the hand-wheel is to accelerate or decrease the speed of rotation of the roller *g*, as may be required, and in general to actuate the roller by hand for any purpose. The axis *i* may, of course, be caused to move slower or faster in the case of mechanical power, by any other suitable means. The upper part of the fork carrying the electrode roller *g* is here shown as constituting a toothed rack *n*, in which engages a pinion *p* carried by the conductor *c* by means of a ring-holder *o*. The pinion *p* is keyed to the axis *q*, which carries a hand lever *r* at its outer end. By raising or depressing the lever *r*, the upper roller electrode *g* may be separated from or advanced towards the lower roller electrode *h*. Furthermore by raising or depressing the forked piece *f* in the conductor *d* the lower removable roller *h* may be adjusted higher or lower.

If now the ends of the objects to be welded are introduced between the two roller electrodes *g h* and the circuit closed, continuous welding may be undertaken, that is to say, an uninterrupted welded seam made, whereby the upper rotary roller electrode *g* may be pressed with any required degree of pressure upon the lower stationary (or rotary) roller electrode *h*, so that the two ends of the material to be welded are firmly connected with each other.

Instead of the objects to be welded being introduced gradually between the electrodes, the electric welding apparatus may be arranged to slide relatively to the stationary objects.

Thus if it is required to weld, for instance, sheets of metal only at particular places, the apparatus shown in Fig. 5 may be advantageously employed, the electrodes *a b* having the form of pins. The lower electrode *b* is then inserted in the conductor *d*, whilst the upper electrode *a* is carried by an arm *s* and by means of a hand-lever *t* carried by said arm *s* can be turned on the shaft *u* in such manner that the points of the electrodes *a b* approach and recede from each other. If then two superposed sheet metal ends to be welded together are introduced between the electrodes and the latter then firmly pressed together and the circuit closed, a small round, very sharply defined place of welding is caused which perfectly answers the purposes of a rivet. In this event, also, especially in the case of thin vessels which are not required to withstand great pressure, the pressure on the place of welding may at the right moment be exactly regulated or kept within the proper limits.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. The process of electric welding, consisting in employing the electrodes not only to conduct the current to the objects being welded, but also to exert a regulable pressure on the same, substantially as described.

2. An electrode apparatus for electric welding, comprising two electrodes between which the objects to be welded are introduced,

Cancelled by letter May 10/04.

and means whereby one of the electrodes can be approachd to and receded from the other, substantially as described.

3. An electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, and means for pressing the electrodes to the work, substantially as described.

4. An electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, means for pressing the electrodes to the work, and means for rotating one or both of the rollers for the purpose of advancing the work in its path between the electrodes, substantially as described.

Cancelled by letter May 10/04.

BLUEPRINT
TOO
LARGE
FOR
FILMING

Cancelled by letter May 10/04.

All communications should be addressed to "The Commissioner of Patents," "Ottawa." When writing on this subject refer to No. 108,990.

Dominion of Canada,
Department of Agriculture,
Patent Office,
Ottawa, May 13, 1904.

Sir,

I am directed to acknowledge the receipt of your letter of the 10th instant, with enclosure, on the subject of Johann Harmatta's Application Serial No. 108,990 for "Electric Welding," Case 1, and in reply inform you that the same has been referred to the Examiner.

I have the honour to be, your obedient servant,

W. J. LYNCH,
Chief of Patent Office.

To Messrs. Marion & Marion,
Montreal, Que.

Patent Office, Canada, Jul. 12, 1904.

MARION & MARION,

Patents and Patent Causes.
Montreal, Can., and Washington, D. C., U. S. A.,
New York Life Building,
Montreal, July 9, 1904.

AMENDMENT.

In the Canadian Patent Office, Application of Johann Harmatta, Electric Welding, Serial No. 108,990, Filed December 1, 1903.

Hon. Commissioner of Patents,
Ottawa, Ont.

Sir:

We send you herewith two copies of new specification and three copies of new claims, also one sheet of drawings on cardboard
B. and two copies of same on tracing cloth, which please substitute for the documents now on file.

Respectfully submitted,

MARION & MARION,
Attorneys.

G./M.

Cancelled by letter C. November 7/04.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. The process of electrically welding thin sheets and the like, consisting in applying pressure at the place of welding of the two superposed metallic objects to be united, for the purpose of effecting thorough superficial contact between them, and then, whilst maintaining the said pressure, heating the objects by passing an electric current through them, substantially as described.

All communications should be addressed to "The Commissioner of Patents," "Ottawa." When writing on this subject refer to No. 108,990.

Dominion of Canada,
Department of Agriculture,
Patent Office,
Ottawa, July 15, 1904.

Sir,

I am directed to acknowledge the receipt of your letter of the 9th instant, with enclosures, on the subject of Johann Harmatta's Application Serial No. 108,990 for "Electric Welding," Case 1, and in reply inform you that the same has been referred to the Examiner.

I have the honour to be, your obedient servant,

W. J. LYNCH,
Chief of Patent Office.

To Messrs. Marion & Marion,
Montreal, Que.

Patent Office, Canada, Nov. 9, 1904.

MARION & MARION,

Patents and Patent Causes.
Montreal, Can., and Washington, D. C., U. S. A.,
New York Life Building,
Montreal, November 7, 1904.

AMENDMENT.

In the Canadian Patent Office, Application of Johann Harmatta, Electric Welding, Serial No. 108,990, Filed December 1/03.

Hon. Commissioner of Patents,
Ottawa, Ont.

Sir:

Cancel the present claims and substitute therefor the enclosed claims. Duplicate extra copies of the claims are herewith presented.

It is requested that on page 1, line 12, and on page 4, line 5,
C. after "sheets" the following language be inserted—from about two millimeters in thickness downward —.

It is believed that this amendment properly limits applicant's invention with regard to known processes, and that the application is now in condition to be passed to issue.

Respectfully submitted,

MARION & MARION,
Attorneys.

G./M.

CLAIMS.

1. The process of electrically welding thin metallic sheets and the like, from about two millimeters in thickness downward, consisting in first pressing intimately together the two superposed metallic objects at the very point, in which the welding joint is to be formed, and then, whilst maintaining the intimate pressure, heating the objects by passing an electric current through them exactly at said point, in which the welding is to be effected, substantially as set forth.

2. The process of electrically welding thin metallic sheets and the like from about two milimeters in thickness downward, con-
D. sisting in superposing the metallic sheets and the like, exerting on said thin sheets and the like before and during the welding operation a pressure limited to a material point, and passing for a short moment a current also limited to said material point through said thin sheets and the like, substantially as set forth.

3. The process of forming seams with thin sheets and the like from about two millimeters in thickness downward, consisting in pressing together the parts to be welded in a series of points consecutively, and, whilst maintaining the pressure in said consecutive points, passing an electric current for a short moment exclusively through said points, substantially as set forth.

Amendment Filed with letter C. Nov. 7/04.

All communications should be addressed to "The Commissioner of Patents," "Ottawa." When writing on this subject refer to No. 108,990.

Dominion of Canada,
Department of Agriculture,
Patent Office,
Ottawa, November 9, 1904.

Sir,

I am directed to acknowledge the receipt of your letter of the 7th instant, with enclosures, on the subject of Johann Harmatta's Application Serial No. 108,990 for "Electric Welding" (Case 1), and in reply inform you that the same has been referred to the Examiner.

I have the honour to be, your obedient servant,

W. J. LYNCH,
Chief of Patent Office.

To Messrs. Marion & Marion,
Montreal, Que.

Patent Office, Canada,
Ottawa, Feb. 25, 1905.

Johann Harmatta, per Messrs. Marion & Marion, Montreal.

Please find papers herewith enclosed, and below a communication from the Examiner in charge of your application, Serial No. 108,990 for "Electric Welding."

GEO. F. O'HALLORAN,
Deputy Commissioner of Patents.

Any communication respecting this application should give the serial number and should be addressed to "The Commissioner of Patents, Ottawa."

It is contended that the amended claims do not overcome the pertinency of the Thomson Patent of record, No. 347,140.

This patent described a process wherein the metal pieces to be joined are first held together by mechanical pressure devices and then while in intimate contact under such pressure an electric current is passed therethrough, exactly at the point of welding.

In Thomson's patent No. 375,022 of record initial pressure is also applied, and, whilst this pressure is maintained, the current is turned on and fusion takes place.

The thickness of the sheets to be welded is not material to the claims, as the conditions of application of the pressure and the size of the current passed is easily regulated and modified to suit the material operated upon.

A. C.

Patent Office, Canada, Nov. 16, 1905.

Johann Harmatta, c/o Marion & Marion, Montreal, Canada. "Improvements in Processes of Electric Welding," Serial No. 108,990.

Hon. Commissioner of Patents,
Ottawa.

Sir:

Responsive to the Official action of February 28, 1905, in the above entitled matter, the duplicate papers are herewith returned, with duplicate copies of the amended claims.

It is contended that the Thomson Patent of record No. 347,140 does anticipate the welding process applied for. In the patent No. 347,140 there is no question of the welding of sheets of very thin material (from about two millimeters in thickness downwards), and by his method of welding such *sheets of very thin material* (from about two millimeters in thickness downward) applicant *solves a problem* which until now was considered as quite *insoluble*.

The U. S. Patent No. 347,140 only speaks of the joining into one continuous length of *sections* of wires—as of copper and its alloys, iron, silver, gold, &c.,—by holding said sections in contact at the point of union and *simultaneously* passing a current of electricity of suitable strength through the joint.

D.

Similarly, in the U. S. Patent No. 375,022 there is only question of welding *bars* of metal together by first *abutting* the bars to be welded, applying a moderate pressure to force them together, passing the welding-current through the junction of the pieces and subsequently to an incipient welding, *increasing the pressure*.

As to be seen, in the named two United States Patents 347,140 and 375,022 there is no question of affording a quite *intimate contact* BETWEEN VERY THIN *sheets of iron*, before the electric current is led to said sheets so as to weld the same together. Besides, in the method forming the subject-matter of the U. S. Patent No. 375,022 a second pressing action is exerted in order to complete the welding process after the heating of the materials has already taken place, quite in contradiction with the new process applied for. Furthermore, applicant does NOT lead the electric current in SIMULTANEOUSLY with *exerting a pressing* action; but, on the contrary, in the process of applicant the pressure is IN ADVANCE with regard to the welding action of the electric current *from the beginning* and also *during the whole duration* of the process.

It is quite certain that never welding trials with very thin sheets of metal—for example, of 0.3 mm thickness—have been effected according to the processes of the U. S. Patents No. 347,140 and 375,022. If such trials had been made by Thomson before the ap-

D.

plication of his U. S. Patent some hints would have been given about the absolute necessity of keeping the pressing action always in advance of the welding proper, because if one does not proceed in this way, a burning through of the thin materials to be welded is unavoidable. It is true that Thomson has provided pressing

means, but he does *not* use said means *in the same manner* as applicant and *besides not for pressing together very thin metal sheets* from about two millimeters thickness downward.

The inventor was occupied during quite a number of years with the electric welding and tried to weld together very thin sheets also with the help of the principles stated in the U. S. Patents 347,140 and 375,022, but he obtained no practical results. Sometimes only an apparently good welding was obtained, but in the majority of cases the thin materials were burnt through and showed holes like a sieve, said holes being produced by electric sparks generated between the metallic surfaces in imperfect contact, and if a welding of such thin sheets could be obtained at all, the material was very much weakened at the place welded, so that said materials could not be used for practical purpose.

Only after long and repeated experiments the inventor, which during its trials found that a heating of the thin materials before the welding operation proper, that is, before the leading in of the

D.

electric current, must be avoided *under all circumstances*, discovered a way or method which permits a welding together of such thin sheets being effected with absolute certainty and reliability, *i. e.*, without a failure being possible.

It is quite true that with the devices of Thomson the eventual possibility existed to work in the same manner as applicant, but as a matter of fact nobody has worked in the same way as applicant and no one before applicant WAS ABLE *to weld so very thin metal sheets* together with absolute reliability, that is, without a burning through or damaging of the very thin metallic sheets being possible.

It is quite remarkable that in all the specifications cited by the Canadian Patent Office there is only question of the electric welding of objects, which can also be welded in an ordinary smithy fire, but in said former specifications absolutely nothing is said about the electric welding of very thin sheets of metal which can not be welded in the fire of a smithy. Therefore, the applicant is entitled to believe that no one before him devoted his attention to the welding of *thin sheets of metal* from about two millimeters in thickness downward, specially on an industrial scale. Consequently, nobody before the applicant was able to discover the fact that in welding very thin metallic sheets, the *pressure must* still be IN ADVANCE with regard to the welding.

D.

Favorable reconsideration and an early allowance is requested.

Respectfully submitted,

MARION & MARION,
Attorneys for Applicant.

Montreal, Canada, November 15, 1905.

D.

All communications should be addressed to "The Commissioner of Patents," "Ottawa." When writing on this subject refer to No. 108,990.

Dominion of Canada,
Department of Agriculture,
Patent Office,
Ottawa, Nov. 16, 1905.

Sir,

I am directed to acknowledge the receipt of your letter of the 15th instant, with enclosure, on the subject of Johann Harmatta's Application Serial No. 108,990 for "Electric Welding," and in reply inform you that the same has been referred to the Examiner.

A package of papers not required by the Office is herewith returned.

I have the honour to be, your obedient servant,

W. J. LYNCH,
Chief of Patent Office.

To Messrs. Marion & Marion,
Montreal, Que.

Patent Office, Canada,
Ottawa, January 11, 1906.

Johann Harmatta, per Messrs. Marion & Marion, Montreal, Que.

Please find papers herewith enclosed, and below a communication from the Examiner in charge of your application, Serial No. 108,990 for "Electric Welding" (Case 1).

GEO. F. O'HALLORAN,
Deputy Commissioner of Patents.

Any communication respecting this application should give the serial number and should be addressed to "The Commissioner of Patents, Ottawa."

Case re-examined on amendments filed November 16, 1905.

It may be remarked that limiting the welding to thin sheets about two millimeters and less in thickness and which can not be welded in the fire of a smithy does not give patentability to an old process.

The Office report of February 28, 1905, applies pertinently to the claims submitted. Said claims are moreover substantially the same as the rejected claims.

The former citation shows methods of welding by first pressing together the articles to be welded, then passing the electric current through them at the points to be welded while still maintaining the pressure. This method, without invention, could be used for lap welding sheets of metal as well as rods.

In reply to applicant's attorney's letter filed on the above date, the Office cites the following United States Patents disclosing methods and means for electrically lap welding metal sheets or bars.

These patents anticipate the amended claims:

690,958 to Hunter, January 14, 1902,
670,808 to Perry, March 26, 1901,
403,708 to E. Thomson, May 21, 1889,
423,735 to C. L. Coffin, Mar. 18, 1890,
437,571 to C. L. Coffin, Sept. 30, 1890,
444,928 to E. Thomson, Jan. 20, 1891,
447,104 to M. W. Dewey, Feb. 24, 1891.

F. D. WITHROW.

Patent Office, Canada, Nov. 9, 1906.

MARION & MARION,

Patents and Patent Causes.
New York Life Building,
Montreal, November 7, 1906.

AMENDMENT.

In the Canadian Patent Office, Application of Johann Harmatta, Electric Welding, Serial No. 108,990, filed Dec. 1/03.

Hon. Commissioner of Patents,
Ottawa, Ont.

Sir:

Responsive to the Official action of January 11, 1906, the duplicate specification and drawings are herewith returned, accompanied by duplicate extra copies of the rewritten claim.

E.

REMARKS.

None of the cited United States patents make a disclosure of electric welding of sheets of two millimeters in thickness, or sheets of even less thickness. Neither is there a disclosure made of placing metallic sheets one upon another and pressing the same together before conducting an electric current through them in such manner that a perfect contact of the parts to be welded is secured.

In the United States patent No. 690,958, cited, the overlapping tin ends are held in the proper position *before* conducting the electric current through, but they are not *pressed* together, as disclosed in the present application. If in this patent the tin ends were pressed together *before* heating, as hard as in the process disclosed by applicant, the small bosses formed in the tins before this step

would be pressed out again. From Claim *3* of this patent it can be clearly seen that the pressure is increased during the welding.

In United States Patent No. 670,808, cited, the welding pressure is only applied when the metal has become heated and soft by the passage of the electric current (see page 1, Claim *2*, lines 60 and 65). In that patent there is the disclosure of welding material having a large cross section, and there is no disclosure of thin metallic sheets. The material being acted upon is different from applicant's disclosure, so that the patent is not as pertinent as at first it would seem to be.

In United States Patent No. 103,708, the welding pressure is only applied after the heating of the material, and not before and during the heating (see page 1, Claim 1, lines 15 to 17). This also applies to United States Patent No. 423,735 (see page *2*, Claim 1, lines 8 to 11) and United States Patent No. 437,371 (see page 1, Claim *2*, lines 98 to 100).

E. In United States Patent No. 444,928 (page 1, Claim 1, lines *35* to *38*) a disclosure is made that the metallic sheets are pressed together, and that the electric current is conducted through them simultaneously. But, there is no disclosure that the pressure is such that a complete surface contact at the place of welding is obtained. It is natural that a certain pressure must be exerted at every welding before the heating, so as to keep the material together in the right position, but the process of applicant is based upon the fact that in operating on thin metallic sheets, a pressure must be exerted at the place of welding so strong that *all unevenness of the metallic sheets* is removed, so that a contact of the complete surface takes place.

As a new technical result obtained by this slight difference, it is submitted that all danger of burning or perforating the material is avoided. Applicant has ascertained through experiments that the minute perforations of the material in electric welding are caused by the formation of very small arcs, or by the effect of the piercing of small sparks. This burning of the material and its perforation always took place where the two thin metallic sheets were to be welded when the sheets were not brought into the closest contact before the current was switched on. It is believed that this fact was not known until now, and that this fact being ascertained, the process based upon it is new.

In United States Patent No. 447,108, the pressure is increased during the welding (see page 1, Claim *2*, lines 67 to 70). It is expressly stated that the material is first heated and made soft by the electric current, and then the pressure is increased. This is different to what is maintained to be new, and the reference therefore is not a pertinent one.

E. If the Examiner is of the opinion that the claim now presented is allowable, the description will be redrawn to conform to the claim.

The Examiner's most careful attention is requested to this single claim, which specifically defines applicant's invention.

Respectfully submitted,

MARION & MARION,
Attorneys for Applicant.

C/W

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The process of electrically welding thin metallic sheets and the like, from about two millimeters in thickness downward, which can not be welded in the fire of a smithy, consisting in first pressing intimately together the two superposed metallic objects at the very point, in which the welding joint is to be formed, and then, whilst maintaining the intimate pressure, heating the objects by passing an electric current through them exactly at said point, in which the welding is to be effected, substantially as set forth.

2. The process of electrically welding thin metallic sheets and the like from about two millimeters in thickness downward, which can not be welded in the fire of a smithy, consisting in superD. posing the metallic sheets and the like, exerting on said thin sheets and the like before and during the welding operation a pressure limited to a material point, and passing for a short moment a current also limited to said material point through said thin sheets and the like, substantially as set forth.

3. The process of forming seams with thin sheets and the like from about two millimeters in thickness downward, which can E. not be welded in the fire of a smithy, consisting in pressing together the parts to be welded in a series of points consecutively, and, whilst maintaining the pressure in said consecutive points, passing an electric current for a short moment exclusively through said points, so as to keep the pressing action in advance of the electric heating during the whole welding operation, substantially as set forth.

All communications should be addressed to "The Commissioner of Patents," "Ottawa." When writing on this subject refer to No. 108,990.

Dominion of Canada,
Department of Agriculture,
Patent Office,
Ottawa, Nov. 9, 1906.

Sir,

I am directed to acknowledge the receipt of your letter of the 7th instant, with enclosure, on the subject of Johann Harmatta's Ap-

plication Serial No. 108,990 for "Electric Welding," Case 1, and in reply inform you that the same has been referred to the Examiner.

I have the honour to be, your obedient servant,

W. J. LYNCH,
Chief of Patent Office.

To Messrs. Marion & Marion,
Montreal, Que.

Patent Office, Canada,
Ottawa, November 26, 1906.

Johann Harmatta, Esq., per Messrs. Marion & Marion, Montreal, Que.

Please find papers herewith enclosed, and below a communication from the Examiner in charge of your application, Serial No. 108,990 for "Electric Welding" (Case 1).

GEO. F. O'HALLORAN,
Deputy Commissioner of Patents.

Any communication respecting this application should give the serial number and should be addressed to "The Commissioner of Patents, Ottawa."

Case reconsidered in view of applicant's attorneys' letter of November 7th, filed November 9, 1906, and the amendments submitted therewith.

The following report may be considered in two parts:

Part 1 dealing with the subject-matter of the specification now on file, filed with applicant's attorneys' letter of July 9, 1904. And part 2 dealing with the patentability of the subject-matter disclosed in the original specification and drawings.

Firstly. The claim may be rejected on the United States Patents of record Nos. 447,104 to Dewey and 444,928 to Thomson.

The tenor and gist of applicant's alleged invention, as interpreted by the Office from his specification above mentioned and principally from his various letters, is as follows: It would appear that his alleged invention consists in welding thin sheets of metal such as used in kitchen ware by pressing said sheets together between electrodes with very great pressure. This pressure being so great that all irregularities and unevenness will be pressed smooth and flattened out of the sheets and that all air space and interstices between the sheets will be eliminated. Then a current is passed between the electrodes whereby the metal is softened and welding takes place as the pressure is maintained but not increased.

Applicant's attention is directed particularly to United States

Patent No. 444,928 to Thomson, page 1, lines 34 to 39; lines 50 to 54; 90 to 95; page 2, lines 1 to 11; and 90 to 94. His attention is also directed particularly to Figures 1, 2 and 3 of the drawings and to Figures 2 and 3 of applicant's original drawings.

Now it will be seen that Thomson's process and apparatus are intended for welding thin sheets of metal. This is done by intimately pressing the sheets together and then passing an electric current through them.

His apparatus and applicant's above referred to would necessarily work in substantially the same way. Thomson's rolls R and R' would press the sheets together with a pressure which increases to a maximum and then electric current will be passed between the electrodes and welding will take place without increasing the pressure. Thus it is seen that Thomson's apparatus provides for eliminating all irregularities and air space between the sheets to be welded. His electrodes are adjustable to and from each other to regulate the amount of pressure required.

However, as Thomson has not made a feature of his specification in using extreme pressure, it may be contended that applicant, in the above amended specification, disclosed certain patentable novelty. This novelty might be considered as pointed out in a claim read somewhat as follows:

> "The process of welding a plurality of metal sheets consisting in exerting a maximum pressure by means of electrodes on said sheets, thereby flattening, smoothing out and eliminating all irregularities and intimately pressing said sheets together whereby air space and interstices between said sheets are eliminated, subsequently passing an electric current through the sheets thus softening and welding same while maintaining but not increasing the pressure on the sheets."

Such a claim would be very narrow and it is doubtful if the courts would maintain it as being valid over the patent of Thomson for it is considered that the Thomson patent approaches so near to the claim that any one skilled in the art without invention would use such a process as pointed out in the above claim. However, as it is the duty of the Office to give an applicant the benefit of any doubt as to patentability, the above claim has been suggested.

Secondly. As above pointed out there appears to be very narrow patentable matter disclosed in applicant's specification and drawings filed with his letter of July 9, 1904. But on a thorough examination and consideration of this case as originally filed, and the amendments, it is held that applicant did not disclose any patentable process in his original specification and drawings, hence consideration can not be given to any claim such as suggested which may be submitted.

In view of the fact that there was no patentable novelty originally disclosed in the application as filed December 1, 1903, this application is held rejected.

The Office has gone very fully into the consideration of this case so that applicant, if he so desires and can in view of the Petition and Oath required file a new application embodying the very limited doubtful patentable matter.

F. D. WITHROW.

APPLICATION FOR PATENT

6 No. 108,990.

AGRICULTURE.

Department of Trade and Commerce
PATENT OFFICE

MONTREAL, QUE.

NOV. 30, DEC. 1 1905

PATENT

No.

DATE.

APPLICANT

JOHANN HARMATTA,

per

MARION & MARION,

N. Y. Life Building,

INVENTION

"ELECTRIC WELDING.

CASE 1.

COST OF COPIES

PATENT AND SPECIFICATION, $
SPECIFICATION
DRAWING
PETITION
OATH

$20.00 Receipt No. 110588

ACTION

Acknowledged by Circular I, and receipt mailed Dec. 4/05.

Action continued.

Exrs. rep't. & dupl. mld. Apr.19/04. Letter and amended papers May 10/13/04 & C.B.D. Ack'd by Cir. 6 May 13/04. Letter and amended claims Jul. 9/12/04 and C.B.D. Ack'd by Cir. 6 Jul. 15/04. Letter and claims Nov. 7/9/04. Ack'd by Cir. 6 Nov. 9/04. Exr's report and dulp. mld. Feb. 28/05. Letter and amd. papers rec'd Nov. 15/16/05. Ack'd by Cir. 6 Nov. 16/05. Cancelled papers rec'd. Examiners' report and dupl. mld. Jan. 12/06. Letter and amd. papers rec'd Nov. 7/9/06. Ack'd by Cir. 6 Nov. 9/06 Exr's rept. & dupl. mld. Nov. 29/06.

93006

2070

Defendant's Exhibit No. 53

A. F. RIETZEL.

CONSTRUCTION OF SHEET METAL UTENSILS.

APPLICATION FILED DEC. 26, 1906.

1,041,351. Patented Oct. 15, 1912.



Fig. 1.

Fig. 2.



Fig. 3.



Fig. 5.



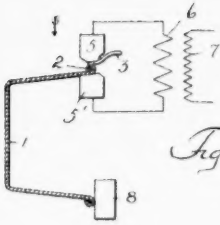


Fig. 4.

WITNESSES:
C. F. Kiechnel Jr
Lillian Bond

INVENTOR
Adolph F. Rietzel
BY
Townsend & Decker
ATTORNEYS

UNITED STATES PATENT OFFICE.

ADOLPH F. RIETZEL, OF LYNN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMSON ELECTRIC WELDING COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

CONSTRUCTION OF SHEET-METAL UTENSILS.

1,041,351. Specification of Letters Patent. Patented Oct. 15, 1912.

Application filed December 26, 1906. Serial No. 349,347.

To all whom it may concern:

Be it known that I, ADOLPH F. RIETZEL, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, with post-office address Lynn, Massachusetts, have invented certain new and useful Improvements in the Construction of Sheet-Metal Utensils, of which the following is a specification.

My invention relates to the manner of securing bail ears, handles or other attachments to the bodies of sheet metal utensils or similar articles. The usual method of securing such attachments is to rivet the ear, handle or other device to the plane surface of the utensil body which, in practice, is a more expensive method of attachment than that provided by my present invention and, moreover, does not form a perfect union such as is desirable when the utensil with its attachment is subsequently subjected to an enameling process. It has also been proposed to secure the attachment to the sheet metal body by indenting the sheet metal attachment or the surface of the body to which it is united to form electrical contacts of restricted area which will localize the heating electric current passed through the metal and bring the parts to the requisite welding temperature so as to permit the parts to be welded by pressure as in the well-known electric welding process. The latter method of attachment requires a special preparation of the parts to be united which it is one of the purposes of my invention to dispense with, while at the same time securing a firm union of the attachment to the utensil body.

Briefly stated, my invention consists in attaching the bail ear or other sheet metal attachment by welding it on its plane face directly to the rounded edge of the utensil body, said rounded edge affording on its point of contact with the plane face of the metal attachment, the contact of restricted extent which, by localizing the current and opposing its free passage, brings the parts quickly to the welding temperature preliminary to the application of the welding pressure. To assist in the localization of the heating effect, the ear or other attachment may be formed with two or more planar projections of restricted area which touch the rounded edge and form in a way heat localizing projections whose office is similar to that of the projections formed on the face of the attachment by indenting the metal as in the previous method of attachment. It is, however, within my invention to dispense with the use of such planar projections, the localization of the heating effect being then due simply to the fact that the plane face of the attachment makes contact with the edge on a rounded surface.

My invention consists further, broadly stated, of a sheet metal utensil having the bail ear or other attachment welded to the edge of the utensil body at a plane face of the attachment.

In the accompanying drawings, Figure 1 is a section through one side of the body of a sheet metal utensil showing the manner in which the bail ear or other attachment makes contact with the rounded edge. Fig. 2 is a plan of a bail ear of the preferred form. Fig. 3 is an end view of the attachment looking toward the end which has the planar projections. Fig. 4 shows the utensil and attachment as assembled between the pressure jaws or blocks of an electric welding apparatus by which the attachment may be welded to the edge of the utensil. Fig. 5 is a face view of the two welding jaws or blocks and illustrates the concave and convex form given to the surfaces in order that they may properly engage the circular edge of the utensil.

Referring to the drawings, 1 indicates the sheet metal body of a utensil having a rounded edge 2 usually employed for the purpose of reinforcing the metal at the edge.

3 is the attachment formed of sheet metal and shown in Fig. 2 as consisting of a bail ear, although as will be obvious, the attachment might be a sheet metal handle of any form or any other attachment which it is desired to secure to the utensil body.

In the preferred form of attachment, the same is provided with planar projections 4 which are adapted to restrict or lessen the area of contact between the attachment and the edge of the utensil. When so formed the union of the attachment and the rounded edge is by the plane faces of said planar projections 4, only, the intermediate portion being free of union with the edge. Ordinarily, it is preferred to use two or more planar projections as described, since the same being located at a considerable dis-

2072

tance apart, form a more secure means of attachment. It would, however, be within my invention to make the union extend continuously across the face of the sheet metal attachment, the same being curved to properly engage the edge of the utensil in a continuous circumferential line. In any case, however, it will be seen that the plane face of the attachment forms a tangent to the curve of the edge of the utensil and thereby gives a restricted or limited area of contact for the passage of electric current used in the welding, thereby localizing the heating in order to quickly and economically heat the parts to a welding temperature at the point of union.

The actual operation of welding is conveniently carried on in an electric welding machine, parts of which are indicated in Fig. 3 diagrammatically. In this figure the contact and pressure jaws or blocks shown at 5, 5′ are adapted to receive the edge of the utensil and the attachment 3 assembled as shown. The parts being lightly compressed together by the operation of the pressure jaws, electric current is permitted to flow and bring the parts to a proper welding temperature after which the quick application of heavy pressure completes the weld and forms a strong union between the attachment and the utensil body on the edge of the latter.

In Fig. 4 the usual transformed secondary of which the pressure blocks 5, 5′ constitute the electrodes is typified at 6, while 7 typifies the transformer primary. 8 is a stop which assists in properly locating the utensil between the jaws 5, 5′. When the utensil body is round at its edge, the jaws 5, 5′ should be properly formed as shown in Fig. 5, the one with a convex face to engage the inside of the utensil body and the other with a concave face to properly engage the curved edge of the attachment.

What I claim as my invention is:

1. A sheet metal utensil having its attached bail ear or other sheet metal attachment welded to a rounded edge of the utensil body by its plane face, as and for the purpose described.

2. A sheet metal utensil having a bail ear or other attachment welded to the edge of the utensil body by two or more projections in the same plane as the main body portion of the ear.

3. A sheet metal utensil having a rounded edge to which the bail ear or other attachment is welded at the plane face, of two or more planar projections extending from said attachment.

4. The combination with a sheet metal utensil, of a rounded reinforced edge on said utensil and a bail ear welded to said edge directly by the plane surface of said ear.

Signed at Lynn in the county of Essex and State of Mass. this 28th day of Nov. A. D. 1906.

ADOLPH F. RIETZEL.

Witnesses:
ADA J. NICHOLS.
ERNEST G. MITCHELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

2073 Defendant's Exhibit No. 72

THE NATIONAL ELECTRIC WELDER CO.

MANUFACTURERS OF

SPOT, BUTT AND SEAM WELDERS

PROMPT ATTENTION GIVEN TO THE DESIGN AND CONSTRUCTION OF MACHINES FOR SPECIAL WORK

4/27/14.

United States District Court
Eastern District of Michigan
Southern Division
Thomson Spot Welder Co Plaintiff
vs
Ford Motor Co Defendant
} In Equity
On Harmatta
Patent No
1,046,066

WARREN, OHIO. April 20th, 1914.

J. Nota McGill,
Att. at Law,
Washington, D. C.

"Defendants Exhibit No 72, Inc Britt Letter 4/20/14" Thomas Durant, Notary Public

THOMAS DURANT NOTARY PUBLIC DISTRICT OF COLUMBIA

Dear Sir:-

I have been expecting to be in your neighborhood and call on you regarding the Harmatte Patent Situation.

The case was filed against the Barney and Berry Co., suit being instituted by the Tompson Co., for enfringement on the Harmatte Patent, and was defended by the Toledo Elec. Welder Co. at Boston last month.

As I understand, the case was set for the week before April 1st, and was postponed until April 1st. I will try to give you an idea of just what happened.

I was sent for hurriedly, at the last moment, and when I got down there, I found that the case was to be tried the same day. I stayed there from the 1st of April until the following Friday evening, when the evidence was all in, and I watched matters pretty close, and I am very much inclined to think that it is a sell-out proposition.

I had quite a talk with Mr. Warren, after we had been there a couple of days, and I found out that he had been down at Brooklyn, with the Universal people, for about three weeks, and the final wind-up was that he could not get together with the Universal people at the early part of the game, and consequently the Tompson people had this case postponed one week. This is what Mr. Warren tells me.
Apparently the Tompson people were very much interested in having the Toledo and Universal people get together.

However, it began to look a little better after the case had been postponed and set forward a week, and Mr. Warren tells me that the night before the case was to be tried, or rather the day before, he had a contract all written up an signed by Lankman of the Universal Co. which was based on a nominal fight on the Patent, and then the Patent would be sustained, and the Toledo Co. would place machines under a rental basis and a percentage of the rental was to go to the Tompson people and

the Universal people. He outlined all the terms to me.

As this was entirely satisfactory to the Universal people, apparently, they signed it through Mr. Lockman, and he then went to the Tompson Co. at Lynn, Mass. and everything appeared to be satisfactory to them, although as I understand it there was no signature passed in that case, as the deal was entirely between the Toledo and the Universal.

When he returned, however, to Boston, to be present at the case, he found that the Universal people were not going to stand by the contract, and they advised him that Mr. Lockman had no business whatever signing such a contract.

Now, whether this was just a matter of safety and they were afraid that the proposition would be brought into the court and used as evidence against them, I cannot say, but it certainly upset Mr. Warren very much when he found out that his agreement apparently was not holding.

The last day of the case I was talking with Warren and he seemed to feel so blue that he was about ready to give up, and he told me that if they lost this case, they were going to clean up every outstanding account they had, and then if there was anything more doing, the customers would have to do it, in other words, he proposed to get in shape to get out of this welder business, and my opinion of the whole situation is that his intention is to clean up all outstanding accounts and then if he can make a deal with the Tompson people, whereby he will continue under their protection, all right, well and good, the customers can get nothing of him and if he cannot, he will try and sell out to the Tompson Co.

Another thing which surprised me was, that I was in Hamilton, O., which is close to Cincinnati Saturday, and I got word that the Toledo Cole plant was shut down due to a strike. This seemed rather peculiar on the face of it, because there are about 75% of the machinists and Hamilton, which is the biggest machine tool center in the world, and the fact that these men are out of work, would indicate that it was a very poor time for a bunch of men to go on strike for an increase of wages. I am therefore inclined to think that this strike was more with a view of closing the plant down for the time being than it was to get anything else. I think that the strike was organized from the office rather than by the men.

Of course, I can see where the Tompson people would not sign up any contract with the Toledo Co. at that particular instance, because proving in the court that such an arrangement had been made would have a tendency to prejudice the judge in favor of the Patent not being valid.

as I understand it now, the evidence on the evidence obtained, will be considered along in the middle of June.

In connection with this matter, I want to say that they are on the stand, and the question was asked me how long I had been in the electric welding business, and I will then ask a the 5th of September, 1911. The attorney for the Union people then asked me if I had ever seen or that any [illegible] previous to this time, and I said that he [illegible] I had, and immediately Mr. Fish, who handled the matter for the Company objected, and said that it was not any part of the defendant's case to prove the gravity of the act. The Court sustained the objection, and the objection was sustained, consequently that was all the evidence that was put in on that matter at any time.

There was no effort on the part of the Union people so far as I could find out, to prove that the [illegible] injured. They were never inclined to say and prove that the [illegible] was not legally allowed, that is, due to the fact that it had been changed so much, and also a disposition on the part and also that the [illegible] which had been used by the Company and hence [illegible] was not actually a fair ballot proposition, but I have talked possibilities, as they were trying to make a [illegible] matter, or rather a [illegible] by a series of words, and I asked Mr. Edwards of the Edwards, Ingram & Bowles Co., [illegible] whether they were trying to prove that this ballot was not actual, or whether they were trying to prove that the Company & Company Co., were not using the ballot as it had been applied for.

Edwards said that they were trying to prove that the ballot was not valid, and I told him that I thought that they were going at it in rather a peculiar way.

However, he said that he thought they had before them an [illegible] chance to win. This is the situation. My opinion is that they've got a chance of a chance to win, considering the evidence that has presented, and also considering the [illegible] of the Court towards the Company Co. The fact of the matter is, the Court asked for advice and received advice and counsel from Mr. Clark, and as a matter would have the impression that Mr. Clark was a [illegible] the Court rather than the Judge.

I am therefore sure such of the opinion that somebody else is going to have to fight this case if it is ever fought.

I want to know whether this matter can be taken up with any [illegible] of Burlington, or that the case could be [illegible] provided the Company Co. and Clark case, and the Union people do not agree to put up a fight.

I am quite [illegible], so far [illegible], to see that we are going [illegible] a fight to finish the case instead of simply [illegible] failure. If you take any [illegible] which you give me will help me to get this thing in shape. I

would be pleased to hear from you, and hope this long letter h
not taken up too much of your valuable time.

Thanking you for your past favors, I am

Very respectfully yours,
The National Elec. Welder Co.
per

F. O. McBerty

FFM/I.

Sec. and Treas.

Defendant's Exhibit No. 73

2077

THE NATIONAL ELECTRIC WELDER CO.

MANUFACTURERS OF

SPOT, BUTT AND SEAM WELDERS

PROMPT ATTENTION GIVEN TO THE DESIGN AND CONSTRUCTION OF MACHINES FOR SPECIAL WORK

13

WARREN, OHIO, February 1st, 1913.

LB50-page 911

J. Bota McGill,
McGill Bldg, Washington, D.C.

Dear Sir:-

Re, Your letter January 29th, 1913.

We forwarded you today by parcel post (registered) the fan blade which was spot welded in 1901 or thereabouts.

We could not give this more prompt attention due to the fact that Mr. McBerty was out of the city, and the writer could not get into the box in which he keeps his valuables(?)

Hoping this arrives without any unnecessary delay, we are

Very respectfully yours,
The National Elec. Welder Co.
By
J. H. McBerty
Assistant Sec'y.

ZAM/LS

United States District Court
Eastern District of Michigan
Southern Division

Thomson Spot Welder Co Plaintiff
vs. In Equity
Ford Motor Co Defendant } on Hannalla Volume No 1046066

Defendants Exhibit No. 73 Jno McBerty Letter
February 1, 1913rd
Thomas Durant
ET Public

THOMAS DURANT NOTARY PUBLIC DISTRICT of COLUMBIA

Board of Examiners-in-Chief Decision in Harmatta vs. DeFerranti

Hearing:
December 17, 1918.
Appeal No. 2844. U. S. Patent Office. June 24, 1919.

BEFORE THE EXAMINERS-IN-CHIEF, ON APPEAL.

In the matter of the interference between the application of Sebastian Ziani de Ferranti, filed December 29, 1911, Serial No. 668,464, division of application filed May 14, 1904, Serial No. 208,034, and the patent to Johann Harmatta, granted December 3, 1912, No. 1,046,066, on application filed December 3, 1903, Serial No. 183,677. Interference No. 36,709.

IMPROVEMENT IN ELECTRIC WELDING.

MESSRS. SPEAR, MIDDLETON, DONALDSON & SPEAR and MR. MELVILLE CHURCH for de Ferranti.

MESSRS. TOWNSEND & DECKER for Harmatta.

De Ferranti has appealed from the decision of the Examiner of Interferences awarding priority of invention to Harmatta.

The invention is defined in an issue of four counts. These are as follows:

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or

Both parties are foreigners. Harmatta has not attempted to carry his date of invention back of his filing date in this country, December 3, 1903. De Ferranti's application in interference is a division of his application No. 208,034, filed May 14, 1904, upon which patent No. 1,148,221 was granted on July 27, 1915. To overcome Harmatta's earlier filing date in this country, de Ferranti relies entirely on the filing of a provisional application in Great Britain on May 25, 1903. The complete specification was left on February 25, 1904, and accepted August 25, 1904. Patent No. 11,921 of 1903 was granted upon that application.

Harmatta contends that de Ferranti's provisional application does not adequately disclose the invention here in controversy. Both parties have taken testimony on this question. The Examiner of Interferences found for Harmatta upon this point and also held that de Ferranti was estopped from asserting priority over Harmatta by the doctrine of Rowntree vs. Sloan, 227 O. G., 744; 45 App. D. C., 207.

De Ferranti's provisional application is particularly directed to a process of attaching turbine blades. And the object of the invention is stated to be the reduction of the large amount of metal theretofore appearing in the turbine ring to which the blades are welded, so as to reduce the flow of heat from the vicinity where the blade is welded to the ring. De Ferranti described in his provisional application several different forms or processes, some of which clearly do not come within the scope of the counts. The provisional specification did not comprise a drawing.

We find that de Ferranti's witness has fairly set forth the inferences which those skilled in the art would draw from this provisional application. De Ferranti's Exhibit No. 1 correctly shows, in our opinion, what those skilled in the art would understand this provisional application to describe. In making the structures of figures 2, 3, 5 or 7 of this exhibit as described in the provisional application, those skilled in the art would infringe the claims which constitute the counts of this interference.

Nor can this disclosure be regarded as accidental merely because the functions and advantages thereof which underlie the invention here in controversy were not appreciated by de Ferranti. They are inherent in his process as disclosed when carried out in the manner indicated in figures 2, 3, 5 and 7 of de Ferranti's Exhibit No. 1.

Nor can this disclosure be regarded as accidental merely because de Ferranti also disclosed the forms or methods indicated in figures 1, 4 and 8 of his Exhibit No. 1 which do not involve the process here in issue. When an inventor positively and definitely describes two or more structures or processes, he is not any the less a discloser and inventor of any one of these than he would have been had he disclosed only that one.

In this connection it is noted that Harmatta's application in inter-

invention when originally filed. The emphasis and claims therein were to the application of pressure to the weld through the electrodes though the present process was unmistakably disclosed.

We hold that the Examiner of Interferences erred in not finding the invention in controversy to be adequately disclosed in the de Ferranti provisional application.

Taking up the question of estoppel we find that de Ferranti appears to have first asserted claims to the present invention on December 6, 1910. As Harmatta's patent did not issue until 1912 de Ferranti is not barred by the same from prevailing here. But the counts of this interference were drawn from a patent to Rietzel No. 247,081 (928,701), which issued upon July 20, 1909. Harmatta made claims to the present invention at least as early as March 31, 1910, and an interference was declared between his application and the Rietzel patent upon April 26, 1910. If de Ferranti had been claiming the present invention at that time he would presumably have been placed in that interference. It is true that the Examiner could have taken steps toward the inclusion of de Ferranti's application in that interference at any time after December 6, 1910, when de Ferranti first laid claim to the present subject-matter. This was presumably overlooked by the Examiner. If the claims that de Ferranti advanced on December 6, 1910, had been advanced before July 20, 1910, he would not have been estopped even though the Examiner did not take steps looking to the addition of de Ferranti to the Rietzel-Harmatta interference. As it is, however, de Ferranti did not make any claim until more than a year after the issue of the Rietzel patent, whereas Harmatta did do so and has prevailed over Rietzel in an interference proceeding. We think that the reasons underlying the decision in Rowntree vs. Sloan, *supra*, apply to the present case and that de Ferranti is accordingly estopped to assert priority over Harmatta. Harmatta must therefore prevail.

The decision of the Examiner of Interferences is affirmed and priority of invention is awarded to Johann Harmatta, the senior party.

Limit of Appeal, July 14, 1919.

FAIRFAX BAYARD,
FRANK C. SKINNER,
E. S. HENRY,
Examiners-in-Chief.

Defendant's Exhibit C. C. C. C. 2081

9—890.

UNITED STATES OF AMERICA,

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the Title Page and Pages 863 and 867, Issue of June 22, 1904, of a Publication entitled:-

PATENTBLATT.

PATENTLISTE

1904

BERLIN.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 9th day of October, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-fourth.

United States District Court
Eastern District of Michigan
Southern Division.
Thomson Spot Welder Company, Plaintiff,
vs.
Ford Motor Company, Defendant
"Defendant's Exhibit CCCC"

In Equity

Acting Commissioner of Patents.

W. S. Thelen Notary Public and Special Examiner

2082

Patentblatt.

Bekanntmachungen

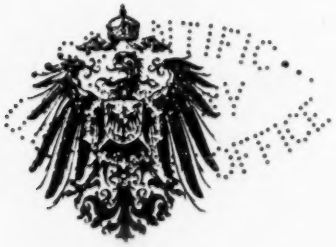
auf Grund des

Patentgesetzes und des Gesetzes betreffend den Schutz von Gebrauchsmustern.

Herausgegeben

vom

Kaiserlichen Patentamt.



Achtundzwanzigster Jahrgang.

1904.

Erster Halbband.

81485

Berlin

Carl Heymanns Verlag.

2083

Das Patentblatt erscheint jeden Mittwoch in zwei Ausgaben, mit oder ohne Patentschriftbeilagen zum Preise von 25 ℳ beim Bezuge für das Halbjahr.

Patentblatt

(Bekanntmachungen auf Grund des Patentgesetzes und des Gesetzes betreffend den Schutz von Gebrauchsmustern)

und

Auszüge aus den Patentschriften.

Herausgegeben von dem Kaiserlichen Patentamt.

Anfragen und Bestellungen sind an das Patentamt, Abonnementsbestellungen zunächst an die Verlagshandlung zu richten oder bei Postanstalten und Buchhandlungen zu bewirken.

1904. Berlin, Mittwoch, 22. Juni Nr 25.

Inhalt: Patente: Anmeldungen; Zurücknahme von Anmeldungen; Vertagungen; Erteilungen; Änderungen in der Person des Inhabers; Änderungen in der Person des Vertreters; Löschungen; Nichtigkeitserklärung; Neudruck von Patentschriften; Patentschriften. — Gebrauchsmuster: Eintragungen; Änderungen in der Person des Inhabers; Verlängerung der Schutzfrist; Änderung in der Person des Vertreters; Löschungen; Zur Nachricht.

GRAS U.S. JUL 14 1904 PATENT OFFICE

Patente.

Anmeldungen.

Für die angegebenen Gegenstände haben die Nachbenannten an dem bezeichneten Tage die Erteilung eines Patentes nachgesucht. Hinter der Klassenziffer ist jedesmal das Aktenzeichen angegeben. Der Gegenstand der Anmeldung ist einstweilen gegen unbefugte Benutzung geschützt.

(Bekanntgemacht im Reichs-Anzeiger vom 16. Juni 1904.)

Klasse

1a. S. 18360. Klassierrost, auf dessen in Umdrehung versetzten Stäben eckige Scheiben oder Rippen in gleichen Abständen angeordnet sind. — Stobawerke Akt.-Ges., Pilsen; Vertr.: C. Pieper, H. Springmann u. Th. Stort, Pat.-Anwälte, Berlin NW. 40. 22/7 03.

2a. T. 13684. Verfahren zur Herstellung von Brot obgl. — Jules Ducreux, Joinville le Pont, Seine; Vertr.: C. Fehlert, G. Loubier, Fr. Harmsen, A. Büttner, Pat.-Anwälte, Berlin NW. 7. 30/5 03.

4a. B. 36212. Straßenlaterne mit umlegbarem Reflektor. — A. Baumgarten & Sohn, Berlin. 23/1 04.

4b. D. 29083. Löschvorrichtung für Dochtlampen. — Frau Amélie Victorine Fernande Hallot, Vincennes, Frankr.; Vertr.: B. Müller-Tromp, Pat.-Anw., Berlin SW. 12. 14/10 02.

5a. T. 9255. Schwengeltiefbohrvorrichtung für Schnellschlag-, Freifall- und Diamantbohrung. — H. Thumann, Tiefbohrgesellschaft m. b. H., Halle a/S. 19/10 03.

7a. D. 13741. Vorrichtung zum Niederhalten und Umlegen von Streifen bei Richtmaschinen. — Duisburger Maschinenbau-Akt.-Ges. vorm. Bechem & Keetman, Duisburg. 22/6 03.

7c. T. 8863. Vorrichtung zum Erhitzen des auf einer Dreh- oder Druckbank zu profilierenden oder zu fassonierenden Hohlkörpers. — Rudolf Thiel, Lübeck. 20/4 03.

8a. G. 19130. Breitfärbemaschine mit Gewebe-rücklauf. — Julius Robert Geißler, Zittau. 3/11 03.

8b. St. 8372. Vorrichtung zum Querfühlen des in doppelt liegendes Gewebe eingelegenden Meßbandes; Zus. z. Pat. 149802. — F. C. Stephan, Crimmitschau. 17/8 03.

12f. V. 7385. Selbstwirkendes Rippgefäß mit einer oder mehreren Füllkammern. — Johannesfelder Maschinenfabrik Schumann & Lächler, Erfurt. 10/6 03.

12i. F. 17293. Verfahren zur Darstellung von salpetriger Säure aus Ammoniak und Sauerstoff durch Katalyse. — Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld. 19/2 03.

13b. G. 18703. Speiseregler für Röhrendampferzeuger für plötzliche Verdampfung mit Windkessel ohne Rückschlagventil in der Leitung zwischen Dampferzeuger und Speisepumpe. — Antonio Galli, Padova, Italien; Vertr.: C. Fehlert, G. Loubier, Fr. Harmsen u. A. Büttner, Pat.-Anwälte, Berlin NW. 7. 5/8 03.

15d. F. 26317. Lagerständer für Auftragwalzen an Buchdruckschnellpressen. — Franz Löpp, Bruchsal, Baden. 19/11 03.

— F. 26688. Vorrichtung zum selbsttätigen Abstellen von Schnellpressen bei Störungen und Unregelmäßigkeiten in der Papieranlage. — König & Bauer, Würzburg. 28/1 04.

— M. 25081. Vorrichtung zur Erwärmung der Druckform bei Buchdruckschnellpressen. — Eugen Mahlau, Frankfurt a/M., Kronprinzenstr. 45. 5/3 04.

18b. D. 13211. Flammofen zur Erzeugung von Stahl. — Victor Defays, Brüssel; Vertr.: B. Müller-Tromp, Pat.-Anw., Berlin SW. 12. 13/1 03.

18c. T. 9041. Verfahren zur Herstellung von einseitig gehärtetem, im übrigen zähen Stahlplatten aus einseitig zementierten Platten. — Tolmie John Trefildder, Sheffield, Engl.; Vertr.: C. Pieper, H. Springmann u. Th. Stort, Pat.-Anwälte, Berlin NW. 40. 4/7 03.

19b. A. 10273. Verfahren, um Straßenflächen gegen Nässe undurchdringlich zu machen. — Allgemeine Städtereinigungs-Gesellschaft m. b. H., Wiesbaden. 27/8 03.

20i. S. 4089. Ausgleichvorrichtung für doppelte Drahtzüge. — Zygmunt Jamofski, Warschau; Vertr.: A. Loll u. A. Vogt, Pat.-Anwälte, Berlin NW. 8. 30/11 03.

20l. D. 14288. Stromabnehmerbügel mit drehbarem Mittelstück für elektrische Straßenbahnen. — Adalbert Domanski, Duisburg, Schwarzerweg 71. 2/1 04.

21a. B. 31924. Verfahren und Vorrichtung zum Fernsichtbarmachen von Bildern u. dgl. Gegenständen

*) Anmerkung. Gedruckte Patentschriften über diese Erfindungen erscheinen erst nach erfolgter Patenterteilung und können jetzt noch nicht bestellt werden (siehe unten die Anmerkung zu „Erteilungen"). Zum Zwecke einmaliger Einspruchserhebung gewährt das Patentamt auf Antrag gegen Gebührung der Kosten Abschriften der Beschreibungen und Zeichnungen.

22h. F. 18041. Verfahren zur Darſtellung blauer bis grüner Farbſtoffe der Anthracenreihe. — Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld. 28/9 02.

22h. B. 35988. Verfahren zur Herſtellung eines Schellackerſatzes. — Dr Heinrich Bamberger, Dresden, Schnorrſtr. 42. 19/12 03.

24e. Sch. 19747. Umſchaltvorrichtung für die Luft- und Dampfzuführung bei Waſſergaserzeugern. — Charles Henry Schill, Manchester u. Horace Goſtineau Hills, Hyde, Engl.; Vertr.: Pat.-Anwälte Dr R. Wirth, Frankfurt a/M. 1 u. W. Dame, Berlin N.W. 6. 12/1 03.

25b. M. 21048. Flechtmaſchine für Bänder udgl. — Louiſe Mundt geb. Lenz, New-York, V. St. A.; Vertr.: Ernſt v. Nießen u. Kurt v. Nießen, Pat.-Anwälte, Berlin N.W. 7. 28/2 03.

34b. C. 12408. Zerkleinerungsvorrichtung für Zwiebel udgl. — Hans Collin, Berlin, Kaſtanienallee 57. 14/1 04.

34e. H. 31977. Schnurzug mit endloſer Schnur für Gardinen, Vorhänge udgl. — Guſtav Hill, Hagen i/W. 14/12 03.

34g. C. 11142. Stuhl mit verſtellbarem Sitz. — Century Thermal Bath Cabinet G. m. b. H., Berlin. 1/10 02.

— B. 5114. Zweiteilige Rolljalouſie. — Vereinigte Berliner & Erdmannsdorfer Fabriken Edmund Boehm & Th. Haroske, Berlin. 6.5 03.

34i. D. 14150. Bratroſt. — Charles Ernest Darcy, Meunier an Hamme, Algérie; Vertr.: Oskar Arendt, Berlin, Friedrichſtr. 216. 24/11 03.

36e. St. 8718. Mit Dampf beheizter Doppelkeſſel. — Erhard Stahl, Mannheim, P. 13, 5. 25/2 04.

40a. S. 18599. Verfahren zum Reinigen von Tantalmetall. — Siemens & Halske Akt.-Geſ., Berlin. 15/10 03.

42l. R. 7241. Vorrichtung zur Verhinderung des willkürlichen Öffnens der Abſperrklappe bei ſelbſttätigen Wagen. — Carl Nagel, Gliesmarode, Braunſchweig. 11/4 04.

42q. D. 14065. Schalldoſe für Sprechmaſchinen mit rechtwinklig gebogenem Stiftträger. — Deutſche Telephonwerke M. Stock & Co., G. m. b. H., Berlin. 22/10 03.

42k. K. 25806. Bilderzuführer für Projektionsapparate udgl. — Dr Alfred Koeppen, Berlin, Luitpoldſtr. 126. 4/9 03.

42l. M. 24514. Maximalthermometer. — Michael Meſſerſchmidt, Eigerödurg i/Th. 1/12 03.

42l. T. 9175. Abſorptions- und Meßbürette für Gasanalyſe. — Otto Tollens, Göttingen, Theaterplatz 9. 16/9 03.

42m. Z. 20926. Zehnerſchaltvorrichtung, bei der die ausrückbaren Zehnerübertragungsräder auf ſchwingenden Hebeln gelagert ſind. — Jacob Calvin Wolfe u. Edwin Wallace Morton, New York, V. St. A.; Vertr.: Pat.-Anwälte Dr R. Wirth, Frankfurt a/M. 1 u. W. Dame, Berlin N.W. 6. 28/4 02.

43b. C. 11257. Selbſtkaſſierender Gas bzw. Flüſſigkeitsverkäufer. — Henry Cosnes, London; Vertr.: Dr A. Levy, Pat.-Anw., Berlin N.W. 6. 15/11 02.

45h. P. 15527. Bruteinrichtung mit einem auf den Eiern liegenden aus Haaren und voneinander unabhängigen Rohren beſtehenden Heizrohrſyſtem. — Fritz Pohl, Berlin, Immanuelkirchſtr. 14. 4/12 03.

45l. B. 32550. Klauenetzen. — Bernhard Brand, Bralin, Ruwänien; Vertr.: R. Neumann, Pat.-Anw., Berlin N.W. 6. 11/9 02.

46c. P. 15308. Elektriſche Zündvorrichtung an Automobilwagen und Motorfahrrädern. — Piorgreh, Motoren- u. Apparatenbau G. m. b. H., [illegible]. 9/9 03.

47b. C. 8981. Spurlagerentlaſtung unter Benutzung der bekannten, auf Schleuderwirkung beruhenden ringförmigen Flüſſigkeitsdichtung. — Hugo Ehrlich, Ludwigshafen a/Rh., Pfälziſche Bank. 2/2 03.

— B. 5321. Schwungrad. Teilſcheibe oder ähnlicher Umlaufkörper. — Karl Viola, Berlin, Ackerſtr. 10. 12/12 03.

47b. T. 12562. Kettenverbindungsſchäkel. — Duisburger Maſchinenbau-Akt.-Geſ. vorm. Bechem & Keetman, Duisburg. 20/5 02.

49f. H. 30180. Verfahren und Vorrichtung zur elektriſchen Schweißung dünner und dünnſter Bleche. — Wilhelm Egel, Berlin-Schöneberg, Akazienſtr. 21. 24/3 03.

50a. H. 30080. Staubſammler. — Fa. Henkel, Landhammer, Prov. Sachſen. 11/3 03.

51c. P. 15192. Verfahren zur Herſtellung von Fröſchen für Pickrondäzen udgl. — Moritz Paulus, Brambach i/V. 25/11 03.

51b. A. 10375. Pneumatiſche Zeichenvorrichtung für Taſteninſtrumente. — The Aeolian Company, New York; Vertr.: Fr. Wiſſert u. Dr V. Zell, Pat.-Anwälte, Berlin N.W. 7. 5/10 03.

52a. Sch. 21182. Nähnadel mit zur Einführung des Fadens dienendem, zwiſchen Öhr und Hinterende der Nadel angeordnetem und dort erweitertem Schlitz. — Paul Schmitt, Göttingen. 11/11 03.

— T. 8689. Maſchine zum webartigen Rand- und Saumnähen. — Guſtav Titzel, Plauen i/V. 14/1 03.

52b. M. 23657. Antriebvorrichtung für die Nadeln bzw. Schiffchen von Schiffchenſtickmaſchinen durch Kurvenſcheibe und Rolle. — Aug. Hermann Meyer, Plauen i/V., Zeunerſtr. 16. 15/6 03.

— P. 5357. Vorrichtung an den die Schiffchenführungsbügel tragenden Führungsorganen an Schiffchenſtickmaſchinen. — Vogtländiſche Maſchinenfabrik (vorm. J. C. & H. Dietrich) Akt.-Ges., Plauen i/V. 2/12 03.

53e. P. 15419. Sterilliſierapparat, beſtehend aus einer Anzahl in einander angebrachter Behälter. — Freiherr Alexander Theodor Pfeiff, Stockholm; Vertr.: Franz Schwenterley, Pat.-Anw., Berlin SW. 68. 22/7 03.

54c. G. 19150. Verfahren zur Herſtellung von Papiermaſchenwaren aus ſogenanntem Zanghoff. — Carl Gaertner, Berlin, Auguſtenbaumdamm 210. 5/11 03.

57a. C. 11093. Verfahren zur Anfertigung photographiſcher Aufnahmen auf unbeſonnenem Lichtdrahtgrunde. — Carl Clauß, Hartburg a/Elbe. 4/9 03.

59a. K. 17462. Kraftſichtiger Tauchrohrſchluß bei Pumpen; Zuſ. z. Pat. 134942. — Andreas Kabovanovic, Zaisch; Vertr.: C. Pieper, H. Springmann u. Th. Stort, Pat.-Anwälte, Berlin N.W. 40. 13/3 02.

63l. B. 21190. Zuberut für Zahnräder. — Oscar Bauder, Cuno b. Zillenthal Erdmannsdorf i. Sachſ. 22/9 03.

64a. H. 30823. Verſchließbarer Mundſchützer für Trinkgefäße. — Frl. Marie Herland, Berlin, Uhlandſtr. 64. 26/6 03.

64b. Z. 21286. Verfahren zum Öffnen und Schließen von Flaſchenverſchlüſſen für Flaſchen. — Hans Schwarzkopf, Berlin, Tauentzienſtr. 20. 5/12 03.

64c. R. 16137. Vorrichtung zum Abfüllen von Spirituoſen udgl. — Heinr. Kaufmann, Frankenhauſen a/Kyffhäuſer. 15/10 03.

72c. Z. 20207. Schießſtand für Luftgewehre, Scheiben. — Ewald Meinhardt, Altenwerder i/Hamb. 26/3 04.

76c. Z. 8561. Aufwindevorrichtung für Zeltplanen (Zeltbahnen) zur Herſtellung von Lagern u. Umzäunung (Kraftſchutzen). — Fritz Zirkner, Bonnewitz i/Sa. 26/1 04.

Defendant's Exhibit E. E. E. E.

(Description)

PATENT APPLICATION,

SPECIFICATION

in the Name of the

PATENT LAW AND OF THE LAW RELATING TO THE PROTECTION OF DESIGNS

ACTS,

Particulars of the

INVENTION APPLIED,

Investigation Time

DATE,

Place Established,

CLASS

SUBCLASS,

(All Rights Reserved)

1085

2086

2086

PATENT GAZETTE.

(Publications on the basis of the Patent Law and of the Law relating to the protection of Utility Models)

and

ABRIDGEMENTS OF THE PATENTS.

Published by the Imperial Patent Office.

1904. Berlin, Wednesday, 22. June No. 25.

PATENTS.

APPLICATIONS. Note: Printed copies of patents for these inventions appear only after the grant has taken place and cannot yet be ordered (see under remarks to "Grants"). For the purpose of possible opposition, the Patent Office furnishes copies of the specifications and drawings upon payment of their cost.

Class:

49f. H. 30189. Process and Apparatus for electrical welding of thin and very thin sheets of metal.

-Wilhelm Egel, Berlin-Schoneberg, Akasien St. 21. 24/3 03.



Defendant's Exhibit B. B. B. B.

2087

S—890.

UNITED STATES OF AMERICA

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the Title Page and Pages 363 and 373, Issue of March 14, 1906, of a Publication entitled:-

PATENTBLATT.

PATENTLISTE

1906

BERLIN.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 9th day of October, in the year of our Lord one thousand nine hundred and nineteen and of the Independence of the United States of America the one hundred and forty-fourth.

United States District Court
Eastern District of Michigan
Southern Division

Thomas Spot Welder Company, Plaintiff } In Equity
Ford Motor Company, Defendant
Defendant's Exhibit 72 73 73 73

Acting Commissioner of Patents.

And Special Examiner

Patentblatt.

2088

Bekanntmachungen

auf Grund des

Patentgesetzes und des Gesetzes betreffend den Schutz von Gebrauchsmustern.

Herausgegeben

vom

Kaiserlichen Patentamt.

Dreißigster Jahrgang.

1906.

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84677

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2089
Manuscripts
Patentamt

Das Patentblatt erscheint jeden Mittwoch in zwei Ausgaben, mit oder ohne Patentbeschreibungen zum Preise von 15 M bezw. 15 ℳ für das Halbjahr.

Patentblatt

(Bekanntmachungen auf Grund des Patentgesetzes und des Gesetzes betreffend den Schutz von Gebrauchsmustern)

und

Auszüge aus den Patentschriften.

Herausgegeben von dem Kaiserlichen Patentamt.

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U.S. APR 1906 PATENT OFFICE

1906. Berlin, Mittwoch, 14. März Nr 11.

Inhalt: Patente: Anmeldungen; Zurücknahme von Anmeldungen; Versagungen; Erteilungen; Änderungen in der Person des Inhabers; Änderung in der Person des Vertreters; Änderung des Wohnorts; Löschungen; Teilweise Nichtigkeitserklärung; Zurücknahme eines Patents; Berichtigung; Patentschriften; Neudruck von Patentschriften. — Gebrauchsmuster: Eintragungen; Änderungen in der Person des Inhabers; Verlängerung der Schutzfrist; Löschungen; Zur Nachricht.

Patente.

Anmeldungen.*)

Für die angegebenen Gegenstände haben die Nachgenannten an dem bezeichneten Tage die Erteilung eines Patents nachgesucht. Hinter der Klassenziffer ist jedesmal das Aktenzeichen angegeben. Der Gegenstand der Anmeldung ist einstweilen gegen unbefugte Benutzung geschützt.

(Bekanntgemacht im Reichs-Anzeiger vom 8. März 1906.)

Klasse

24. D. 14936. Teigknetmaschine mit in entgegengesetztem Sinne umlaufenden Walzen oder sich entsprechend bewegenden Angriffsflächen. — Christian Friderich Dietz, Chicago; Vertr.: C. Gronert u. W. Zimmermann, Pat.-Anwälte, Berlin S.W. 61. 26/7 04.

42. M. 26706. Aus einem elektromagnetischen Unterbrecher bestehende Zündvorrichtung für Gasbrenner. — Multiplex Internationale Gaszünder Gesellschaft m. b. H., Berlin. 4/1 05.

42. P. 14138. Verfahren zur Herstellung eines gleichmäßigen Kopfes an Glühkörpern nach Patent 132094; Zus. z. Pat. 132094. — Patent-Rund-Kopf-Glühkörperfabrik Ernst von Bülow, Schöneberg. 15/10 02.

42. B. 38233 Gasglühlichtbrenner, bei welchem der Glühkörper durch vom Mischrohr ausgehende Zweigröhrchen beheizt wird. — Adolf Bachner, Berlin, Bülowstr. 59. 8/10 04.

— L. 20124 Nach unten gerichteter Gasglühlichtbrenner. — Fritz Kiesler, Hamburg, Beim Strohhause 49. 10/8 05.

59. Sch. 20986. Exzentrischer Bohrmeißel. — Philipp Schlosser, Bustenari, Rum; Vertr.: E. Dalchow, Pat.-Anw., Berlin N.W. 6. 26/6 05.

59. R. 21368. Gesteinbohrmaschine mit durch eine gespannte Feder bewirkter Stoßbewegung und elektromotorischem Antrieb. — Fritz Rosemann, Hermsdorf, Bez. Breslau. 11/7 05.

68. E. 10750. Expansions- und Verschlußvorrichtung für Posteursiefässer. — Eisenhüttenwerk Thale, Akt.-Ges., Berlin. 30/3 05.

*) Anmerkung. Gedruckte Patentschriften über diese Erfindungen erscheinen erst nach erfolgter Patenterteilung und können jetzt noch nicht bezogen werden (siehe unten die Anmerkung zu „Erteilungen"). Zum Zwecke etwaiger Einspruchserhebung erteilt das Patentamt auf Antrag gegen Gebührung der Kosten Abschriften der Beschreibungen und Zeichnungen der Anmeldungen.

7a. H. 33232. Vorschubvorrichtung für Flügerschrittwalzwerke zum Auswalzen von Rohren und Hohlkörpern zur Erzielung einer stoßfreien Einführung des Werkstücks zwischen die Walzen. — Otto Heer, Düsseldorf, Graf Adolfstr. 45. 18/6 04.

7b. S. 19799. Vorrichtung zum Stumpfschweißen von Rohren. — Fr. C. Sentenbrenner, Düsseldorf-Oberkassel. 13/7 04.

7f. H. 31193. Verfahren zur Herstellung von Pflugscharwerkstücken verschieden wählbarer Länge durch Auswalzen und Trennen des Walzstabes. — Hasenclever & Sohn, Vogelsang i/W. 24/8 03.

8b. A. 11827. Plätt- oder Bügelmaschine mit ausziehbarem Bügelbrett. — Mathias Achenbach, Rötestr. 89, u. Dreifus & Lehmann, Stuttgart. 3/3 05.

8e. R. 20327. Belüftungseinrichtung für mit Vakuum arbeitende Entstäuber. — Dr Peter Raths, Anna Raths u. Julius Raths, Bonn a/Rh., Kirschenallee 3. 26/10 04.

9. B. 39326. Zahnbürste oder ähnliche Bürste, deren Stiel mit einer Nut und gegebenenfalls mit einem Absatz zum Festhalten einer auswechselbaren Borstenplatte versehen ist. — Bernhard Fredrik Burman, Stockholm; Vertr.: A. Loll u. A. Bogt, Pat.-Anwälte, Berlin W. 8. 27/2 05.

— L. 29425. Bündelabteilvorrichtung zum Abteilen von Bündeln aus geschichtetem Bündelstoff vermittels einer unter dem Stoff gleitenden und mit einem Haken versehenen Schiene. — Georg Kleemann, Stuttgart, Seufferstr. 24. 19/4 05.

— P. 17827. Bürste oder Besen. — Minna Sophie Friederike Petersen, Hamburg, Norderstr. 175. 9/11 05.

12b. W. 21852. Verfahren zur Trennung von Gemischen flüssiger und fester, schmelzbarer Stoffe, wie Öl und Stearin, Paraffin udgl. in Filterpressen mit zwecks Ausübung einer Pressung auf das Filtergut inelnander dicht geführten Filterplatten. — Gustav Wagner-Schmidt, Wien; Vertr.: E. Lamberts, Pat.-Anw., Berlin S.W. 61. 15/2 04.

12e. Sch. 21551. Vorrichtung zur Reinigung von Hochofengasen udgl. — Louis Schwarz & Co., Dortmund. 1/2 04.

12i. D. 15948. Verfahren zur Darstellung von Natriumperborat. — Deutsche Gold- u. Silber-Scheide-Anstalt, vorm. Roeßler, Frankfurt a/M. 3/6 05.

12p. F. 19997. Verfahren zur Darstellung einer o-Oxychinolinsulfosäure. — Franz Fritzsche & Co., Chemische Fabrik, Hamburg. 25/3 05.

Zurücknahme von Anmeldungen.

a) Die folgenden Anmeldungen sind vom Patentsucher zurückgenommen.

12a. G. 20610. Heizvorrichtung für Vakuumverdampfer usw. mit die Rohrmündungen aufnehmenden Verteilungskammern. 27/12 05.

28b. M. 28155. Verfahren und Vorrichtung zum Glattmachen der gewirbelten Haare bei Fellen. 15/2 06.

45c. S. 17532. Kartoffelerntemaschine mit Rost und Fördervorrichtung. 27/12 05.

63f. M. 27324. Bremsvorrichtung für durch Druckluftmotor angetriebene Motorfahrzeuge. 22/2 06.

b) Wegen Nichtzahlung der vor der Erteilung zu entrichtenden Gebühr gelten folgende Anmeldungen als zurückgenommen.

7b. B. 39146. Metallpresse mit elektrisch beheizter Preßkammer. 30/11 05.

20b. H. 2507. Einrichtung zur Herstellung der Förderrolle von Lederschärfmaschinen mit scheibenförmigem Messer, das in einem am Maschinengestell festen Lager drehbar ist. 11/12 05.

35a. G. 13628. Fahrbare Bühne mit federndem Sitz für Fördergestelle. 7/12 05.

46c. Sch. 22701. Lamellenkühler mit senkrecht stehenden, aus profilierten Blechen hergestellten Kühlelementen. 30/10 05.

54g. D. 13386. Leuchtendes Reklameschild. 27/11 05. — R. 21226. Warenhalter für Schaufensteranlagen. 4/12 05.

59b. H. 31974. Hochdruck-Zentrifugalpumpe mit doppelten, seitlich übereinander liegenden Schaufelkränzen einseitiger Beaufschlagung. 28/9 05.

68b. H. 33984. Feststellvorrichtung mit einem am Fensterflügel befestigten, kreisförmig gebogenen und mit Einkerbungen zum Einlegen einer am Gewände drehbar gelagerten Sperrklinke versehenen Sperrarm. 30/11 05.

77f. E. 10453. Schreitende Figur mit von einer oder mehreren Doppelkurbeln abwechselnd nach unten gedrückten und angehobenen, mit den Füßen gelenkig verbundenen Kurbelstangen. 27/11 05.

Das Datum bedeutet den Tag der Bekanntmachung der Anmeldung im „Reichs-Anzeiger". Die Wirkungen des einstweiligen Schutzes gelten als nicht eingetreten.

Versagungen.

Auf die nachstehend bezeichneten, im „Reichs-Anzeiger" an dem angegebenen Tage bekannt gemachten Anmeldungen ist ein Patent versagt. Die Wirkungen des einstweiligen Schutzes gelten als nicht eingetreten.

8f. T. 9373. Verfahren zur Herstellung baumwollener Luftspitzen, Luftstickereien, Posamenten usw. 28/11 04.

22b. F. 21400. Darstellung eines Schwefelfarbstoffs. 11/4 04.

29a. B. 31965. Walzenpaar zum Vorbereiten faserhaltiger Pflanzenfasergut, namentlich Ramie, für das Schwingen. 17/11 04.

33a. T. 9628. Aus einer auf das Ende eines Spazier- oder Bergstockes aufzusetzenden Platte bestehender Rückenstützer. 8/6 05.

49f. H. 30189. Verfahren und Vorrichtung zur elektrischen Schweißung dünner und dünnster Bleche. 20/6 04.

80b. L. 18947. Verfahren zur Herstellung von Zement aus Hochofenschlacke, Kalk und anderen Zuschlägen durch Mischen der vorgewärmten Zuschläge mit glühender Hochofenschlacke. 18/8 04.

Erteilungen.*)

Auf die hierunter angegebenen Gegenstände sind den Nachgenannten Patente erteilt, die in der Patentrolle die hinter die Klassenziffern gesetzten Nummern erhalten haben.

Das beigefügte Datum bezeichnet den Beginn der Dauer des Patents. Am Schluß ist jedesmal das Aktenzeichen angegeben.

(Bekanntgemacht im Reichs-Anzeiger vom 12. März 1906.)

Von 170121 bis 350.

1a. 170321. Wasch- und Sortiervorrichtung für Sand, Kies usgl., bei der das Waschgut eine Kolonne hinter- und übereinander stehender, geneigter Waschbehälter mit zwischengeschalteten Sieben und Wasserzuführungen durchläuft. — Paul Peter Chmeleff, Moskau; Vertr.: E. Dalchow, Pat.-Anw., Berlin NW. 6. 29/3 05. — C. 13516.

4a. 170322. Laterne für Fuhrwerke mit Fahrpreisanzeiger, welche drehbar in dem drehbaren Laternenarm angebracht ist. — Marcus Rosenbaum u. Carl August Johansson, Stockholm; Vertr.: Franz Schwenterley, Pat.-Anw., Berlin W. 66. 11/3 05. — R. 20891.

4g. 170323. Spiritusvergaser; Zus. z. Pat. 163822. — Albert Witzel, Stuttgart, Sonnenbergstr. 35. 4/9 04. — W. 22721.

— 170324. Gasglühlichtbrenner; Zus. z. Pat. 161270. — Jul. Charl. Friedr. Jürgens u. Rud. Gust. Witt, Hamburg. 21/1 05. — J. 8233.

— 170325. Vorrichtung zum Regeln der Menge der inneren und äußeren Verbrennungsluft bei Gasglühlichtbrennern. — Erich Werwath, Linden b/Hannover. 4/4 05. — W. 23681.

— 170326. Knallgasbrenner, insbesondere für Kalklichtlampen. — Drägerwerk Heinr. & Bernh. Dräger, Lübeck. 2/8 05. — D. 16105.

5b. 170268. Teleskopartig ausgebildete Spannsäule für Bohrmaschinen. — Eduard Sirtaine, Essen, Ruhr, Geisbergstr. 6. 18/9 04. — S. 20047.

5c. 170166. Verfahren zum Niederbringen von Senkschächten in festem und wasserführendem Gebirge. — Donnersmarckhütte, Oberschlesische Eisen- und Kohlenwerke Akt.-Ges., Zabrze, O/S. 9/9 01. — D. 15187.

5b. 170327. Vorrichtung zur Ermittelung der Abweichung von Bohrlöchern von der Senkrechten, bei der die Abweichung durch ein in einem drehbaren Rahmen frei schwingendes Pendel angezeigt wird. — Hugh Frederick Marriott, West Cliff, Transvaal; Vertr.: H. Neubart, Pat.-Anw., Berlin SW. 61. 25/8 04. — M. 26011.

6a. 170158. Tragbare Vorrichtung zum Waschen, Mischen, Weichen und Lüften von Getreide, insbesondere für Mälzereizwecke, sowie zum Belüften von Gärungsflüssigkeiten. — Carl Baudach u. Oscar Lange, Küstrin. 25/12 04. — B. 38827.

6b. 170167. Verfahren zur Herstellung von fuselölarmen oder fuselölfreien vergorenen Flüssigkeiten. — A. Koch, Berlin-Schöneberg, Hauptstr. 4. 21/8 03. — K. 25830.

170168. Apparat zur Abscheidung von Vorlaufprodukten aus Spiritus. — Fa Max Strauch, Reiße, Schles. 6/1 05. — St. 9291.

6b. 170121. Verfahren zum Raffinieren von Rohspiritus, besonders Rohspiritus aus Lüftungswürze, mittels Wasserstoffsuperoxyds. — Christian August

*) **Anmerkung.** Bestellungen auf die Patentschriften sind ausschließlich an das Patentamt zu richten; sie müssen das Patent nach Nummer, Namen und Gegenstand angeben und sollen, soweit irgend tunlich, innerhalb der nächsten 14 Tage eingesandt werden. Preis der einzelnen Patentschrift ist 1 ℳ, beim Bezuge von mindestens 20 Stück einer Nummer oder bei Vorbestellungen auf einzelne Klassen je 50 Pf. Näheres ergibt die Bekanntmachung im Blatt f. Pat.-Muk.- u. Zeichenwesen vom 27/9 1900.



Defendant's Exhibit D. D. D. 2091

(Translation)

PATENT GAZETTE.

PUBLICATIONS

on the basis of the

PATENT LAW AND OF THE LAW RELATING TO THE PROTECTION OF UTILITY MODELS.

Published by the

IMPERIAL PATENT OFFICE.

Thirtieth Year

1906.

First Half-Volume.

84677

BERLIN.

Carl Heymann, Printer.

United States District Court
Eastern District of Michigan
Southern Division
Thomson Spot Welder Company, Plaintiff, } In Equity.

PATENT GAZETTE

(Publications on the basis of the Patent Law and of the Law relating to the protection of Utility Models)

and

ABRIDGEMENTS OF THE PATENTS.

Published by the Imperial Patent Office.

1906. Berlin, Wednesday, 14 March No. 11.

PATENTS.

APPLICATIONS.

REFUSALS.

49f. H. 30189. Process and Apparatus for electrical welding of thin and very thin sheets of metal. 20/6 04.

2093

Deft's Exhibit a a a a

A. M. STANLEY.

WELDING PRESSURE CONTACT.

APPLICATION FILED JAN. 23, 1915.

1,176,614. Patented Mar. 21, 1916.

Fig. 1.



Fig. 2



Fig. 3.

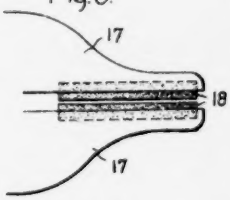


Fig. 4.

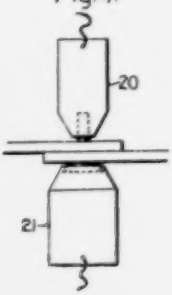


Fig. 5.

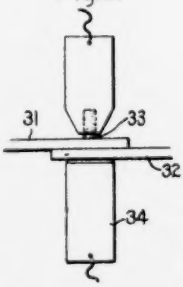


Fig. 6.

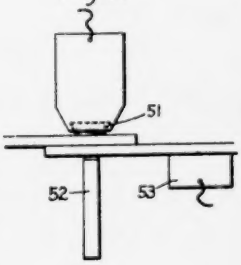
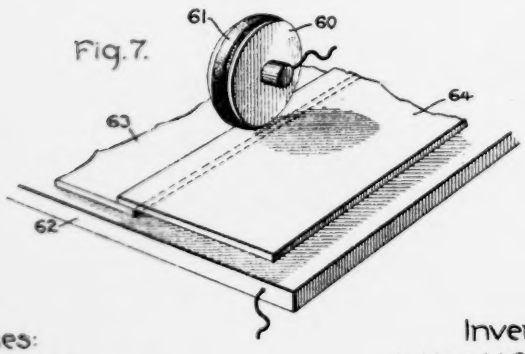


Fig. 7.



Witnesses:

Helen Orford

Margaret E. Hoolley

Inventor

Arthur M. Stanley

by Albert G. Davis

His Attorney.

Defendant's Exhibit F. F. F. F.

2004

Defts Exhibit aaaa

UNITED STATES PATENT OFFICE.

ARTHUR M. STANLEY, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

WELDING PRESSURE-CONTACT.

1,176,614. Specification of Letters Patent. Patented Mar. 21, 1916.

Application filed January 23, 1915. Serial No. 3,946.

To all whom it may concern:

Be it known that I, ARTHUR M. STANLEY, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Welding Pressure-Contacts, of which the following is a specification.

My invention has reference to electric welding by heating the surfaces of the objects to be welded by the passage of an electric current between them while they are in contact under pressure, as distinguished from welding by heating the surfaces of the objects by an electric arc formed between them and then contacting these surfaces under more or less pressure. The former process is generally spoken of as "resistance welding", because the welding heat is a function of the electrical resistance of a short portion of the objects back of the contacting surfaces, and of the transition resistance between the surfaces; while in the arc welding process the welding heat is almost entirely due to the arc formed between the surfaces.

There are two species of resistance welding, namely, butt welding and sheet welding. In butt welding, the two objects to be welded together are each tightly held in a clamp of very low resistance and high thermal conductivity and are brought into contact with moderate pressure, the current being supplied through the clamps, so that there is practically no resistance in the clamps and between each clamp and the respective welding object. The clamps are, therefore, not noticeably heated and impart no heat to the welding objects, the heat being developed solely in the welding objects at and near their contacting surfaces, and the clamps acting as current conveyers and heat dissipating means, so that the temperature of the welding objects back of the contacting surfaces is kept low. In sheet welding clamps cannot be conveniently employed and are generally not employed, and, in fact, the term "sheet welding" properly applies only to those cases where welding clamps are not employed. In these cases, as where two or more sheets are superimposed and welded together, face to face, the welding current is supplied to the sheets at the place where a weld is to be made by pressure contacts, the same as by the clamps in butt welding, with this difference, however, that whereas the clamps have a negligible resistance and a negligible transition resistance toward the welding objects, the pressure contacts being small in cross-section, have a noticeable resistance and a decided transition resistance toward the sheets.

My invention has reference to sheet welding and more particularly to the welding of sheets made of metals of low specific resistance and high thermal conductivity, such as copper, brass, aluminum and others.

Heretofore sheet welding on sheet-iron, sheet-steel and sheets of other metals of comparatively high specific resistance and low thermal conductivity has been accomplished with varying success with the use of copper pressure contacts, but it was found impossible to make successful sheet welds between copper, brass, and other like metals. The pressure contacts of copper were found to be useless when sheet-copper was attempted to be welded, because they tended to chill the sheets, which themselves are good conductors of heat, and to chill them to such an extent that with a moderate current the welding heat could not be imparted to the sheets, and when the current was raised the pressure contacts themselves became welded to the sheets.

I have found that in order to successfully weld sheet copper (which may here serve as the representative of low resistance and good heat conducting metals) it is necessary that the pressure contacts be of a material that has a considerably higher specific resistance than copper and that its ohmic resistance be sufficiently high that it may be heated by the current as much or more than the copper and then act as a barrier to heat conduction from the work; that it be a comparatively low conductor of heat for the same purpose; that it be more refractory than copper, so that it will not soften and become welded to the copper; and that it have considerable mechanical strength and not be noticeably deteriorated by exposure to air at the temperatures to which it is subjected. I have found all these characteristics combined in the metals tungsten and molybdenum, and by the use of either of them as pressure contacts I have been able to weld together sheets of copper and other metals of like properties safely and expeditiously, and without deterioration of the contacts after long continued use. It is not

2035

Defts Exhibits aaaa

necessary that the whole body of the pressure contact piece be made of tungsten or molybdenum, since it is all sufficient that the contact proper be a short piece of tungsten or molybdenum carried by any other suitable metal, which latter may be considered as a backing or carrier of the pressure contact proper. All this will more fully appear from the following detail description with reference to the accompanying drawing, in which a number of the many possible forms in which my invention may be embodied are set forth and illustrated.

Figure 1 is a side elevation of a form of welding pressure contact made in accordance with my invention. Fig. 2 is a side elevation of another form of welding pressure contact. Fig. 3 is a side elevation of the jaws of a machine carrying another form of welding pressure contacts, also suitable for brazing. Figs. 4, 5, and 6 are views illustrating the application of my invention in welding two sheets together at a single spot at a time; and Fig. 7 is a perspective view illustrating the application of my invention to continuous line welding.

In Fig. 1 the contact support 10 is rather bulky and may be made of copper, but any other metal of sufficient bulk so as to have a small ohmic resistance may be used. In the end of this bulky piece of copper is inserted the welding pressure contact proper 11, and this is made of either molybdenum or tungsten, or of any other substance which has the hereinbefore described characteristics of molybdenum and tungsten. It is inserted in the piece 10 to a considerable depth so as to be well united with the same, and only a very short piece of it projects; and it is this short projecting piece of molybdenum or tungsten which serves as the welding pressure contact in accordance with my invention. Owing to its considerable mass, the carrier prevents the welding pressure contact proper from becoming overheated. The shape of the welding pressure contact is immaterial; it may be cylindrical or prismatic or have any other cross-section, but under all circumstances it must not project beyond the carrier 10 to any considerable length. I have found that if this piece projects about one eighth of an inch, it gives very satisfactory results under most conditions; while when it projects considerably more than one eighth of an inch it generally gets too hot and imparts too much heat to the sheets to be welded, which are then liable to be burned through. In Fig. 2 the construction shown is similar to that of Fig. 1 except that in this case the welding pressure contact 16 is in the form of a button having beveled edges inserted into a recess formed in the carrier 15, and the metal of the carrier is then spun over the bevel of the contact and thus firmly holds it in place. It will be understood that in both of these constructions, in fact, in all applications of my invention, the copper or other carrier of the welding pressure contact is not intended to come into contact with the sheets which are to be welded, as will appear farther on.

In Fig. 3 the welding pressure contacts 18 of molybdenum or tungsten are inserted in the faces of jaws 17 for a considerable length and may have any suitable width, either for welding sheets together over a considerable surface in one operation, or for brazing them together.

It will be understood that the structures shown in Figs. 1 and 2 are supposed to be parts of a welding machine; that the current is conducted primarily to the carriers 10 and 15; and that the sheets to be welded together are overlapped and the overlapped portion is inserted between two such structures as are shown in either Fig. 1 or Fig. 2, or between two structures like Fig. 1 and Fig. 2. In some cases only one of these structures is used and the other necessary pressure contact is supplied otherwise. Thus, a highly successful weld can be made by the arrangement shown in Fig. 4 in which one carrier and contact 20 is constructed like that shown in Fig. 1 and the other is constructed like that shown in Fig. 2. Welding by the use of two such pieces is known in the art as spot welding, the weld only occupying a surface equal to that of the smaller of the two welding pressure contacts. The welding operation usually takes about one quarter of a second of time so that in the practical operation of spot welding the two sheets which are to be welded together are usually placed upon one of the welding pressure contacts and the other welding pressure contact is quickly brought down upon the sheets in alinement with the other and is almost immediately thereafter withdrawn. This is the practical operation, which is well known in the art as spot welding of sheet iron. Usually and preferably one of the welding pressure contacts is broader than the other, since in this manner the work does not become perceptibly marred.

In Fig. 5 I have illustrated the welding of a sheet of copper 31 to a sheet of steel 32. In this case the welding pressure contact 33 which comes to bear upon the copper sheet must be either molybdenum or tungsten in accordance with my invention, while the pressure contact piece 34 upon which the sheet steel rests may be of copper.

In Fig. 6 I have illustrated an arrangement in which only one of the welding pressure contacts 51 is a terminal of the circuit that carries current to the work. The other terminal 53, is a block of any desired shape in contact with one of the sheets of the cou-

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Welds Exhibit a a a a

ple which is to be welded together, and 52 represents the plunger of a punch which presses the two sheets against the contact 51 and thus localizes the weld.

Fig. 7 illustrates my invention in its application to line welding. The roller 60 of copper or other good conductor has a slightly projecting rim 61 of molybdenum or tungsten which constitutes the welding pressure contact and two sheets 63, 64 of copper are supported upon a table 62 which constitutes one of the terminals, the roller 60 being the other terminal. As this roller is moved along the overlapping edges of the two sheets, current being supplied to the apparatus as indicated, a welded seam is formed expeditiously, the speed of the roller being gaged according to the current supplied and according to the thickness of the sheets.

It is quite practicable to weld together three or more superposed sheets of copper or other low resistance material if the rule is observed that the welding pressure contacts must project from the carrier to a greater distance as the number of superposed sheets increases; but under all circumstances the projection of the welding pressure contact must be very short, within the range of about one-eighth to one-fourth of an inch.

It should be understood that the constructions herein shown and described may be changed in form, size and proportions without deviating from my invention; and wherever in the appended claims the metal tungsten is recited, it is to be understood that the metal molybdenum is the equivalent of the same.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A sheet metal welding pressure contact having the described characteristics of tungsten and molybdenum.

2. A sheet metal welding pressure contact having the described characteristics of tungsten and molybdenum and a carrier for the same having low electrical resistance and large heat radiating surface.

3. A sheet metal welding pressure contact of refractory high resistance material which is only slightly affected by the oxygen of the air at high temperature, and a carrier for the same having low electrical resistance and large heat radiating surface.

4. A sheet metal welding pressure contact of tungsten.

5. A sheet metal welding pressure contact of tungsten and a carrier for the same having low electrical resistance and large heat radiating surface.

6. A sheet metal welding pressure contact of tungsten and a carrier for the same of copper having large heat radiating surface.

In witness whereof, I have hereunto set my hand this 22nd day of January, 1915.

ARTHUR M. STANLEY.

Witnesses:
ALEX D. SALINGER,
CHARLES E. HEYWOOD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

398 Proceedings in the United States Circuit Court of Appeals for the Sixth Circuit.

Appearance of Counsel.

[Filed March 21, 1921.]

Arthur B. Mussman, Clerk of said Court:

Please enter my appearance as counsel for the Appellant. Fish, Richardson & Neave. Stevenson, Carpenter, Butzel & Backus.

Order Approving Stipulation that 20 Copies of Record be Filed.

[Filed April 6, 1921.]

The stipulation of the parties that only twenty copies of the record need be filed with the clerk is approved.

399

Order Assigning Cause for Hearing.

[Filed June 7, 1921.]

This cause is assigned for hearing at the ensuing October session. Two and one half hours will be allowed each side for oral argument.

Cause Argued and Submitted.

(October 10, 1921.—Before Knappen, Denison, and Donahue, C. JJ.)

This cause is argued by Mr. Frederick P. Fish, for the appellant and by Mr. Melville Church, for the appellee and is submitted to the Court.

Decree.

[Filed June 28, 1922.]

Appeal from the District Court of the United States for the Eastern District of Michigan.

This cause came on to be heard on the transcript of the record from the District Court of the United States for the Eastern District of Michigan, and was argued by counsel.

400 On Consideration Whereof, it is now here ordered, adjudged and decreed by this Court, that the decree of the said District Court, in this cause be and the same is hereby affirmed with costs.

Opinion.

[Filed July 3rd, 1922.]

401 Filed Jul. 3, 1922. Arthur B. Mussman, Clerk.

United States Circuit Court of Appeals, Sixth Circuit.

No. 3555.

THOMSON SPOT WELDER COMPANY, Appellant,

vs.

FORD MOTOR COMPANY, Appellee.

Appeal from the District Court of the United States for the Eastern District of Michigan.

Submitted October 10, 1921; Decided June 28, 1922.

Before Knappen, Denison, and Donahue, Circuit Judges.

KNAPPEN, *Circuit Judge:* Suit for infringement of United States patent No. 1,046,066, December 3, 1912, to Johann Harmatta, assignor to Thomson Electric Welding Company, which is the predecessor of plaintiff company. The invention relates to that branch of electric resistance-welding known as spot-welding, by which two sheets of metal are welded together in spots, as a substitute for riveting. Generally speaking, the welding is accomplished by the application of pressure and heating current, localized in spots on the opposite plane faces of the two metal sheets. Specifically, two pointed electrodes are applied to the opposite faces of the sheets, the electrode which feeds the electricity into the work and heats the metal to the welding point being caused to exert the pressure required to accomplish the weld. The specification states that "the necessary pressure may be exerted at the place of welding by the aid of any of those technical means which are suitable for producing or transmitting pressure, e. g., with a press either direct or by means
402 of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power, or by other means." The 21 claims of the patent relate some to the process, the others to the product.

Plaintiff relies on claims 3, 8, 12 and 17 as typical. They are printed in the margin.[1] The prominent defenses are anticipation, lack of invention, prior public use and estoppel. The district court

[1] "3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

found each of these defenses established and dismissed the bill. (268 Fed. 836.) Non-infringement is pleaded but not urged.

The patent has been adjudicated in but one other suit, viz., Thomson Electric Welding Co. (plaintiff's predecessor) v. Barney & Berry, in the First Circuit, decided in 1915. In that case Circuit Judge Dodge, who presided in the district court, held the patent void for lack of invention. The Circuit Court of Appeals held that the patent was not anticipated and that it involved invention, and reversed the judgment of the district court. The opinions of both the district court and of the circuit court of appeals are reported in 227 Fed. 428 et seq.

The art of electric resistance welding was old and far advanced in 1903, when the Harmatta patent was applied for. Professor Elihu Thomson, the head of plaintiff company and of its predecessor, was a pioneer in that art. In 1886 he obtained process and apparatus patents respectively (Nos. 347,140 and 347,141) for so-called butt-welding, which involved the uniting of the abutting ends of
403 metal wires, bars, etc., by applying heat at the joint and the adjacent surfaces by means of electrodes, and pressing the two pieces together when heated to welding temperature. There was here true resistance welding, with pressure of the parts involved, although the electrode did not exert the welding pressure. In 1889 Thomson obtained a patent (No. 396,015) for electric riveting, which involved the heating of the rivet when in place by means of a current passed through it by the use of electrodes, under pressure thereon, the effect being not only to swage the rivet and weld it to the adjoining metal, but apparently (when desired) to weld together, in part at least, the portions of the plates immediately adjoining the rivet.

In 1891 Thomson obtained a patent (No. 444,928) for what is called lap-welding. While the specification states that the invention is specially adapted to the welding of the overlapped edges of

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"8. The method of electrically welding two plates or sheets of metal together face to face between electrodes, consisting in restricting the area of contact of an electrode with said plates to a spot, passing a heating electric current from said electrode to the co-operating electrode through said spot to heat the work to welding temperature and applying pressure to the work in line with said spot to effect a welding of one plate to the other.

"12. The method of electrically welding two pieces of sheet metal to one another, consisting in pressing the sheets together by pressure applied and localized in a distinct well-defined joint or spot on the rear surface of a sheet while passing an electric current through them in the line of the pressure, thereby localizing the path of the heating current from one to the other of the meeting surfaces of the sheets to cause the said sheets to be heated to welding temperature by the electric resistance of the work at said spot, and applying pressure localized over said spot whereby the pieces are welded together at a distinct well-defined spot in their meeting surfaces answering the purpose of a rivet.

"17. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas."

plates, it is not so limited, but expressly includes "welding together strips, sheets, plates or bars of metal where it is desirable to form a joint of considerable length." According to the specification, "the surfaces to be welded are pressed together to form a union," the work being fed in the longitudinal direction of the joint "through suitable pressure devices [preferably roller electrodes], the work being properly arranged, so that the pressure devices will press the surfaces to be welded together and simultaneously passing the electric current through the work *at the point of pressure.*" The electrodes were employed to exert the welding pressure. The specification further states that "as the work is passed through such rolls with a continuous motion *each point,* as it comes between the rolls, is heated and the surfaces pressed together," etc. By way of further description of one of the figures it is said that "the electric current being now turned on as it passes from one roller to the other and across the point of pressure will heat the work to the welding temperature * * * after which the screw can be given a few more turns to effect a solid union. The work *having been thus started,* may now be moved along through or between the rolls so as to bring successive parts of the joint into position to be pressed and heated at the same time." [2]

In 1893 Thomson obtained a patent (No. 496,019) relating particularly to soldering sheet metal pieces flatwise, either by the use of solder or (when applied to tin-plates) by melting the tin
404 sufficiently to establish union thereby. The electrodes, in the form of clamps or otherwise, served not only to supply the necessary heat, but to exert sufficient pressure upon the overlapped sheets to effect their union. A roller electrode is disclosed, performing the double function of heating and pressing, and having its periphery corrugated or grooved. As stated in the specification—"The rollers exert pressure while the current heats the thin metal pieces at successive points between the rollers." This was, to say the least, electric-resistance spot-soldering.

In 1897 Robinson received a patent (No. 574,942) on so-called projection-welding, as specially applied to the welding of a splice-bar to the web of a railroad rail, the splice-bar having upon its inner face a number of projections which by the application of the heating current are fused, and by pressure made to form welds between the projections on the bar and the fused opposing portions of the rail. Kleinschmidt, in 1898, took out a patent (No. 616,436) for a similar process, and by methods not essentially unlike those of Robinson.

Whether or not the Thomson so-called lap-welding invention should be regarded as an absolute anticipation of the Harmatta patent, we think the state of the art to which we have referred left no room for invention in Harmatta. Thomson's lap-welding patent is criticized as not plane-face welding, much less spot-welding. We see no distinction upon principle between plane-face welding and lap-welding; the former certainly embraces the latter. If Thomson's roller electrode device was capable of welding a line or seam

[2] All italics in this opinion are ours.

in a metal lap-joint, it was readily adaptable to line-welding together coterminous plane-face plates. Harmatta's original application made in ignorance of Thomson) disclosed roller electrodes broadly enough to include that very use. We think Thomson's lap-welding invention was in essence a welding in points. In fact, his line seam was merely a succession of adjoining points. The specification repeatedly speaks of the "point of pressure," says that "each point as it comes between the rolls is heated," etc.; "the current passes across the point of pressure." It satisfactorily appears that although Thomson's roller electrodes in the form shown in the patent, were not practicably adapted to commercial spot-welding as disclosed by the Harmatta patent, they could readily be made to do such spot-welding by the use of suitable projections upon the face of the rolls (Thomson later did spot-soldering by the use of such projections); and assuming that pin electrodes were essential
405 to successful commercial spot-welding, that form of electrodes was old, as illustrated by Thomson's electric soldering patent referred to. In our opinion the art of soldering is analogous to that of welding. The difference in degree of heat generated by the electric resistance, as required in welding and soldering respectively, is not sufficient to defeat analogy. By the use of enough more heat Thomson's soldering device could readily have effected spot-welding. Such analogy seems recognized in the Benardos patent, whose invention is applied "to welding thin metal sheets and rods, and the soldering of metals as well as their hardening and annealing"; and in the Lemp patent (No. 553,932) issued to plaintiff's predecessor, which provides for "welding, soldering, cementing, or similar operations." No essential difference in principle between heating at points and heating in spots is apparent. Projection welding partakes, though not in so pronounced a sense, of the nature of spot-welding.

We agree with Judge Dodge that Harmatta's idea of "making his electric welds small in area rather than large in comparison with the areas of the opposed surface to be joined and isolating them so as to leave each surrounded by a comparatively large area of unwelded surface" does not involve invention in view of the prior art. In other words, given the desire for a welding in spots, naturally enough suggested by the prior art and by its commercial development, we think Harmatta's specific application of the principles of that prior art involved only the skill of the expert mechanic. Not only every principle, but every electric and mechanical process involved in the Harmatta claims was well-known in the prior or directly analogous arts, or in mechanical arts generally. We can not think in view of the prior art, that invention is to be found in the considerations, separately or collectively, that in Harmatta no bodily movement of the sheets is required, that the current is localized and pressure exerted solely by the electrodes, or by the difference in the form of the electrodes, or by the difference in amount of extruded metal, as compared with some of the earlier applications of resistance-welding. Although invention is not necessarily negatived by the fact that each element of the combination is old, the

question of fact whether the combination itself involves invention in view of the prior art is always present.

Our conclusion of non-invention, based upon a review of the prior art, is materially strengthened by the serious doubt whether Harmatta thought, when he filed his patent-application, that
406 he had patentably invented anything by the disclosure of spot welding, as a process or product distinct from point-welding or line-welding; as well as by the fact that others previous to the grant to Harmatta, and apparently in ignorance of Harmatta's claimed invention, successfully practiced the art of spot-welding. Harmatta's application was filed December 3, 1903. For "continuous welding," the specification disclosed roller electrodes for exerting pressure "whereby the advancing series of single points of the seam to be welded is united to a whole with a minimum amount of current." It also showed pin-shaped electrodes "which may be adapted to work on the smallest possible surface of contact," which could be used for the "welding of two metal sheets of equal thickness, intermittently or at certain spots only," and by the use of which, as illustrated, "a small round, very sharply defined place of welding is caused which perfectly answers the purposes of a rivet." But none of the claims contain in terms any reference to spot-welding. The first claim related to the process of electric welding "consisting in employing the electrodes not only to conduct the current to the objects being welded, but also to exert a regulable pressure on the same;" the second, to an apparatus for electric welding "comprising two electrodes between which the objects to be welded are introduced and means whereby one of the electrodes can be approached to and receded from the other;" the third, to an electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, and means for pressing the electrodes to the work"; the fourth, to an "electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, and means for rotating one or both of the rollers for the purpose of advancing the work in its path between the electrodes." Each of the four claims would literally read upon Thomson's lap-welding or roller-electrode device. The natural inference would be that Harmatta regarded the principle employed in roller-electrode and pin-electrode welding as the same. The patent office found nothing patentable in Harmatta's application until six years later. The patent issued nine years after the application was filed, and after numerous vicissitudes and amendments (including the entire elimination of the roller-electrode feature), and after the application had been placed in interference with the claims of Adolph Rietzel, to whom a patent had previously been issued on July 20,
407 1909; Rietzel's claims, as allowed, being adopted by Harmatta at the suggestion of the patent office for purposes of interference. Rietzel was the engineer, superintendent and general manager of plaintiff's predecessor. His application was filed February 24, 1905, and presumably in ignorance of Harmatta's application or claimed invention. From the beginning Rietzel's applica-

tion was owned by plaintiff's predecessor. The interference was declared in favor of Harmatta, for Rietzel's failure, as the junior party to the interference, to take testimony in support of his claim of priority-plaintiff's predecessor at the time owning both the Harmatta application and the Rietzel patent. What we have said is not intended as a criticism of plaintiff's predecessor or of counsel, or of the patent office. But the fact that the award of priority was not based upon an adjudication on the merits tends to weakens its force.

It, however, convincingly appears in the record before us that in 1898 (and about five years before Harmatta's application) Rietzel, while in the employ of plaintiff's predecessor, in several instances successfully joined two pieces of lapped metal at isolated spots by means of a Thomson butt-welding machine, the sheets of metal being united by pressing them together and at the same time passing the heating current from one electrode (or socalled contact) to the opposite electrode, at the selected spot on the meeting surface of the plates, the spots being restricted in area so as to leave well-defined and comparatively extensive areas of no-union completely surrounding the spots; one of the electrodes or contacts used being of standard size and form, the other being reduced by cutting down to a diameter of about $\frac{3}{8}$ of an inch.

Assuming, for the purposes at least of this opinion, the correctness of the contention that these spot-welds, while satisfactory and successful, were not considered by Rietzel a commercially practical experiment, and did not amount to a reduction to practice within the meaning of the patent law, or became an abandoned experiment, Rietzel's experience strongly discredits inventive quality in what Harmatta did several years later, including his disclosure of the use of pin-electrodes.

The fact also appears in this record that at various times, ranging from two years to five or six years before the issue of the Harmatta patent, and apparently in ignorance of his asserted invention, various manufacturers put out or used spot-welding machines with commercial success. Some of these uses antedated the issue of the
408 Rietzel patent. These experiences also tend to discredit invention in Harmatta.

It follows, in our opinion, from what has been said that the effect of the great commercial success of the Harmatta invention in the hands of plaintiff is entitled to little weight upon the question of invention, even were that question otherwise in doubt, which we think it is not.

Our conclusion of non-invention makes it unnecessary to consider the alleged McBerty prior use, the defense of equitable estoppel asserted against plaintiff, the standing of the De Ferranti patent, or any of the other defenses presented.

The decree of the district court is affirmed.

Denison, Circuit Judge, dissents.

409 United States Circuit Court of Appeals for the Sixth Circuit.

I, Arthur B. Mussman, Clerk of the United States Circuit Court of Appeals for the Sixth Circuit, do hereby certify that the foregoing (in five volumes) is a true and correct copy of the record and proceedings in the case of Thomson Spot Welder Company vs. Ford Motor Company, No. 3555, as the same remains upon the files and records of said United States Circuit Court of Appeals for the Sixth Circuit, and of the whole thereof.

In testimony whereof, I have hereunto subscribed my name, and affixed the seal of said Court, at the City of Cincinnati, Ohio, this 5th day of July, A. D. 1922. Arthur B. Mussman, Clerk of the United States Circuit Court of Appeals for the Sixth Circuit. [Seal of the United States Circuit Court of Appeals, Sixth Circuit.]

410 UNITED STATES OF AMERICA, *ss:*

[Seal of the Supreme Court of the United States.]

The President of the United States of America to the Honorable the Judges of the United States Circuit Court of Appeals for the Sixth Circuit, Greeting:

Being informed that there is now pending before you a suit in which Thomson Spot Welder Company is appellant, and Ford Motor Company is appellee, No. 3555, which suit was removed into the said Circuit Court of Appeals by virtue of an appeal from the District Court of the United States for the Eastern District of Michigan, and we, being willing for certain reasons that the said cause and the record and proceedings therein should be certified by the said Circuit Court of Appeals and removed into the Supreme Court of the
411 United States, do hereby command you that you send without delay to the said Supreme Court, as aforesaid, the record and proceedings in said cause, so that the said Supreme Court may act thereon as of right and according to law ought to be done.

Witness the Honorable William H. Taft, Chief Justice of the United States, the second day of December, in the year of our Lord one thousand nine hundred and twenty-two. Wm. R. Stansbury, Clerk of the Supreme Court of the United States.

United States Circuit Court of Appeals for the Sixth Circuit, ss.

I, Arthur B. Mussman, clerk of the United States Circuit Court of Appeals for the Sixth Circuit, do hereby certify that the transcript of the record of the proceedings of this court in the within entitled case heretofore certified by me for filing in the Supreme Court of the United States was correct and complete as the same then appeared in this Court.

In pursuance of the command of the foregoing writ of certiorari I now hereby certify that on the eighth day of December, A. D., 1922, there was filed in my office a stipulation in the above entitled case in the following words to wit:

412 No. 3555.

THOMSON SPOT WELDER COMPANY

vs.

FORD MOTOR COMPANY.

In the above entitled case it is stipulated that the record heretofore filed in the Supreme Court of the United States in support of the Petition for Certiorari may be taken as a return to the Writ of Certiorari. Thomson Spot Welder Company, by J. L. Stackpole, Its Attorney. Melville Church, Attorney for Respondent.

I further certify that the above is a true and correct copy of said stipulation and of the whole thereof. Witness my official seal, signature and the seal of said Circuit Court of Appeals at the City of Cincinnati, Ohio, in said Circuit this eleventh day of December, A. D. 1922. Arthur B. Mussman, Clerk U. S. Circuit Court of Appeals for the Sixth Circuit. [Seal of the United States Circuit Court of Appeals, Sixth Circuit.]

413 [Endorsed:] File No. 29,139. Supreme Court of the United States, October Term, 1922. No. 589. Thomson Spot Welder Company vs. Ford Motor Company. Writ of Certiorari. Filed Dec. 11, 1922. Arthur B. Mussman, Clerk.

414 [Endorsed:] File No. 29,139. Supreme Court U. S., October Term, 1922. Term No. 589. Thomson Spot Welder Company, Petitioner, vs. Ford Motor Company. Writ of certiorari and return. Filed Dec. 13, 1922.

Office Supreme Court, U. S.
FILED
NOV 5 1923
WM. R. STANSBURY
CLERK

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1922.

No. 120

THOMSON SPOT WELDER COMPANY,
Plaintiff-Petitioner,

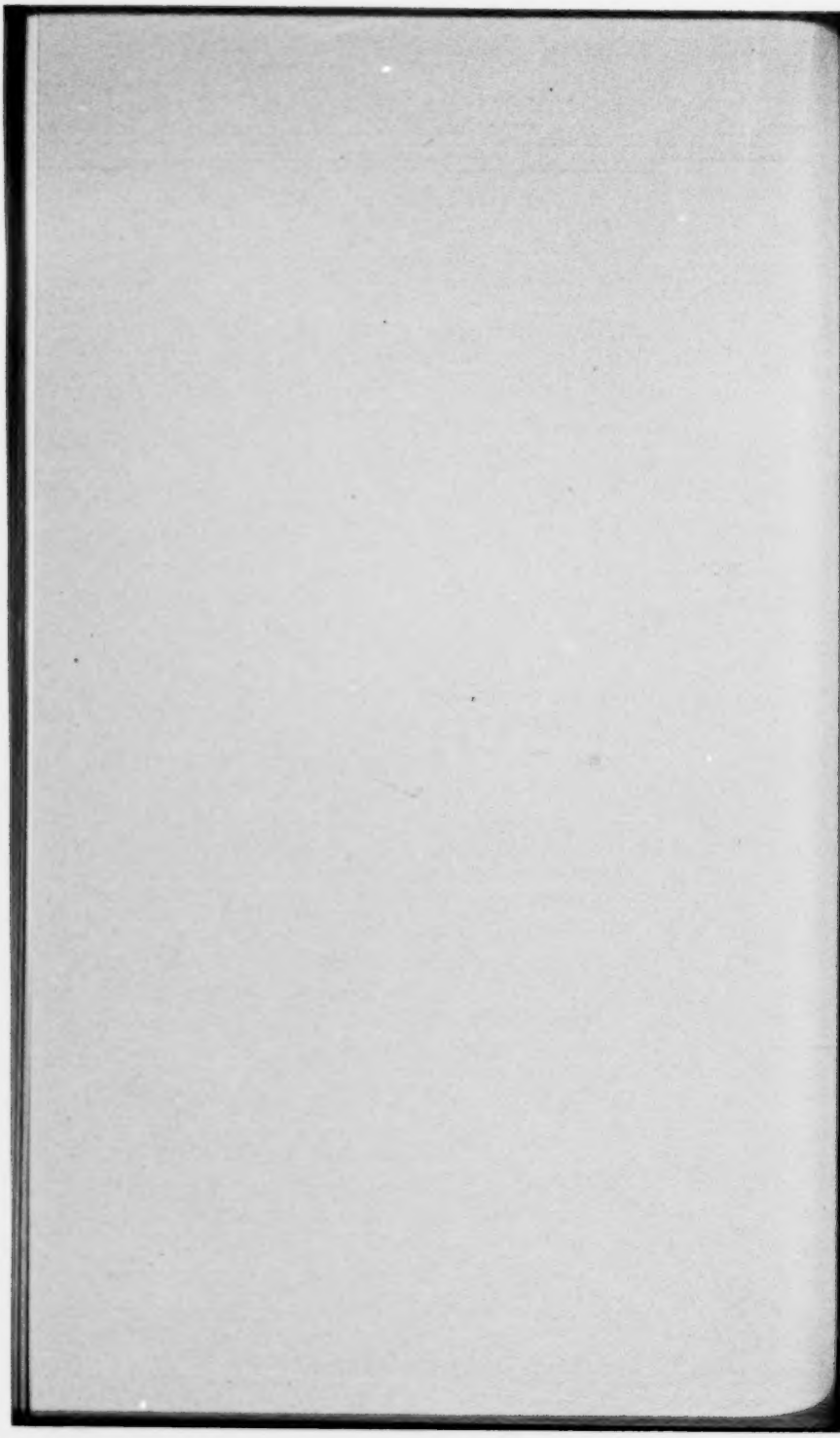
v.

FORD MOTOR COMPANY,
Respondent.

BRIEF FOR PLAINTIFF-PETITIONER.

FREDERICK P. FISH,
J. L. STACKPOLE,
H. F. LYMAN,
of Counsel for Plaintiff-Petitioner.

L. H. LANE, Law Printer, 221 High Street, Boston.



INDEX OF HEADINGS.

	Page
Statement of the Case	1
The Issue and the Defenses	4
CHAPTER I,— HARMATTA AND THE PRIOR ART	6
Harmatta and the Prior Art	6
Electric Welding	6
The Patentable Quality of Harmatta's Invention	9
The Harmatta Invention	10
A Typical Spot Welding Machine	14
The Novel Technique of Harmatta's Process	15
Patentable Novelty of Harmatta's Invention Briefly Stated	18
Patents of the Prior Art	19
Benardos Patent No. 363,320	23
German Patent to Benardos No. 50,909	24
Coffin Patent No. 437,571	26
Thomson Soldering Patent No. 496,019	27
Blanchard Patent No. 466,266	31
Lemp Patent No. 531,197	32
Burton Patent No. 647,694	32
Thomson Riveting Patent No. 396,015	35
Thomson Patents Nos. 347,140 and 347,141	40
Thomson Roller Lap Welding Patent No. 444,928	40
Thomson's Lap Welding Roller Process a Butt Welding Process	47
Lemp Patent No. 553,923	53
Robinson Patent No. 574,942	57
Kleinschmidt Patent No. 616,436	58
Perry Patent No. 670,808	60
Parkinson British Patent No. 14,536 of 1894	61
Ferranti and Rietzel	64
Ferranti British Patent No. 11,921 of 1903	64

Page

Rietzel Patent No. 928,701 and Rietzel's Early Abandoned Experiments 69
Summary of the Prior Art 73
Opinion of the Court of Appeals for the Sixth Circuit . 75
The History of the Commercial Art Shows Invention by Harmatta 86
Professor Wagner's Comparison of Harmatta's Invention with the Prior Art 88
Harmatta's Process Introduced into the United States in 1904 92
Infringement 92
Summary of Facts so far Discussed 95
Patentability of the Idea of Electrode Spot Welding . 97
Authorities on Patentable Processes 99
Cases of Patentable Articles Analogous to the Harmatta Product 105
The Claims 108
Cases on Construction of Claims 110

CHAPTER II, — THE HARMATTA FILE-WRAPPER . 112
The Harmatta File-Wrapper 112

CHAPTER III, — THE MCBERTY PRIOR USE DEFENSE . 122
McBerty's Effort to Sell His Evidence to the Thomson Company 128
Counsel for the Barney & Berry Company thoroughly Investigated the McBerty Story, Concluded that it Amounted to Nothing and Decided Not to Rely on it in the Barney & Berry Case 131
Following the Decision in the Barney & Berry Case, McBerty's Company took a License under the Harmatta Patent and Admitted its Validity . . . 133
McBerty's Present Story Departs from and Enlarges upon his 1913 Story Notably in Two Essential Particulars 134

Page

McBerty's Story of 1913 135
McBerty's Present Story 145
The Evidence Proves Positively that McBerty's Story Cannot be True 147
The Space Limitations on McBerty's 1901 Machine were such as to make it Impossible to Spot Weld Fan Blades to Fan Centres on that Machine . . 149
McBerty Could Not Have Done Spot Welding when He Says He Did it in 1901 because His Transformer Would Not Give Sufficient Current . . . 163
McBerty Could Not Have Welded the G-Type Fan Spiders to Fan Blades because those Spiders were Brass — Not Steel 165
The "Corroborating Evidence" Produced by Defendant to Support McBerty's Story on Analysis Wholly Fails to Corroborate it 170
The Cut of the G-2 Fan in the Warren Company's 1901 Catalogue 170
The Catalogue is Proved by Defendant's Own Witnesses to Have been Published at a Time before McBerty Claims to Have Done or Could Have Done any Spot Welding . . . 172
The Catalogue Cut Shows a Riveted and Not a Rivetless Fan 174
The Exhibits in Evidence Purporting to be Specimens of McBerty's 1901 Work 177
Exhibit H 177
McBerty's Newly Produced Specimen, Defendant's Exhibit M, is Spurious 178
Other Specimens of McBerty's Alleged 1901 Work 182
The "Corroborating" Witnesses 185
Powers and Lipps 190
Craft, McDonald and Gilder 190
Smith 192
Many Witnesses, Familiar with the 1901 Butt

Page

Welding Machine, Never Heard of its Being Used for Spot Welding 193
No One Claims to Have Actually Seen McBerty Weld the "Trayful" of Fan Blades and Spiders 194
The Possible Actual Facts in the Matter . . 196
The Testimony of Defendant's Witnesses was Falsely "Refreshed" by Showing Them the Misleading Catalogue Cut and the Reconstructed Exhibit B 198
Prior Use Must be Proved Beyond Reasonable Doubt by Contemporaneous Concrete Evidence . . 200
Even if McBerty's Story were to be Accepted as True in Toto, it Amounts Only to an Abandoned Experiment, Insufficient to Anticipate a Patent . . 206
Summary as to McBerty Defense 213
Events Occurring after December 3, 1903, Cannot Affect the Validity of the Harmatta Patent . . 216

CHAPTER IV,—THE RELATIONS OF THE PLAINTIFF TO RIETZEL AND TO THE RIETZEL PATENT . . 219
Defendants Estoppel Contention is Clearly Unsound . 239

CHAPTER V,—THE BARNEY & BERRY CASE . 241
The Barney & Berry Case 241
Conclusion 246

INDEX OF CUTS.

	Page
Thomson No. 347,140, No. 347,141 — Butt Welding,	6
Harmatta	12
Plaintiff Exhibit No. 1, Defendant's Spot Welder	14
Technique of Harmatta Process	16
Bernardos No. 363,320 — Heating by Electric Arc	23
Bernardos German No. 50,909 —1889 — Hot Resistor Heating	25
Thomson No. 496,019 — Electric Soldering	27
Lemp No. 531,197 — Local Annealing	32
Burton No. 647,694	34
Thomson No. 396,015 — Electric Riveting	36, 37
Thomson No. 444,928 — Roller Lap-Joint Welding	45
Kleinschmidt No. 616,436 — Projection Welding	59
Perry No. 670,808 — Cross-Wire Welding	61
Parkinson — British No. 14,536 — 1894 — Glut Welding	62, 63
Rietzel No. 928,701 — Projection Welding	70
Defendant's Exhibit B	149
Cast Brass Spider	166
Sheet Steel Spider and Hub	167

INDEX OF EXHIBITS REFERRED TO IN OUR BRIEF AND NOT APPEARING IN PRINTED RECORD.

The printed record does not contain a list of the exhibits not printed in the record. The principal physical exhibits are not listed in the record. For the convenience of the Court, we here list those physical exhibits to which we have referred, stating where they were introduced in evidence and where they are discussed in our brief.

	Record Vol	Page	Our Brief Page
Plaintiff's Ex. 2, Attached to Plaintiff's Interrogatories, — Example of infringing product produced by Defendant . .	I	21	93
Plaintiff's Ex. 11—"List of Licensed Spot Welder Machines."	I	135	3
Plaintiff's Ex. 38-Photo No. 1, shown to Brewer by Wm. E. Smith . . .	I	308	176
Plaintiff's Ex. 39-Photo No. 2, shown to Brewer by Wm. E. Smith . . .	I	308	176
Plaintiff's Ex. 51-Fan purchased by Gravell and identified by Binder . . .	I	382	166, 168, 179, 186
Plaintiff's Ex. 64. p. 589 — Electrical World, March 4, 1909 . . .	I	363	167
Plaintiff's Ex. 68—1910 Peerless Catalogue	I	376	167
Defendant's Ex. 2—Warren Specialty Elec. Co., 1901 Catalogue . . .	I	499	166, 170, 179, 186, 198, 214
Defendant's Ex. B — McBerty Welding Machine	I	500	149, 151, 185, 198
Exhibit B — Fan Blade attached to Brown Affidavit (Plaintiff's Ex. 33) . .	I	481	182

	Record Vol. Page	Our Brief Page
Exhibit H — Sample attached to Lipps' Affidavit (Plaintiff's Ex. 30) . .	I 452	140, 156, 177, 196, 215
Defendant's Ex. I —1902 Peerless Catalogue	II 729	180
Defendant's Ex. M — Fan Blade and portion of Spider marked as of Feb. 15, 1901,	II 737	126, 146, 178, 187, 215
Exhibit O — Welded Fan Blade attached to 1913 McBerty Affidavit (Plaintiff's Ex. 28)	I 442	182–184
Exhibit P — Welded Fan Center Arm attached to 1913 McBerty Affidavit (Plaintiff's Ex. 28)	I 443	182–184

INDEX OF CASES.

	Page
Acme v. Commercial, 192 Fed. Rep. 321, 327, 328 .	67
American Bell Tel. Co. v. Cushman, 35 Fed. Rep. 734,	188
Barbed Wire Patent, 143 U. S. 275 .	106, 122, 201
Barrett et al. v. Hall, 1 Mason, 447 . . .	235
Carnegie Steel Co. v. Cambria Iron Co., 185 U. S. 403,	98, 102
Chadeloid Chemical Co. v. Thurston Co., 220 Fed. Rep. 685	131
Cochrane v. Badische Anilin & Soda Fabrik, 111 U. S. 293, 296–310	111
Commercial Mfg. Co. v. Fairbank Canning Co., 27 Fed. Rep. 78	235
The Corn Planter Patent, 23 Wall. 181, 211 . .	208
Deering v. Winona Harvester Company, 155 U. S. 286,	203
Diamond Rubber Co. v. Consolidated Rubber Tire Co. and Rubber Tire Wheel Co., 220 U. S. 428, 434,	107

Page

Downes v. Teter-Heany Development Co., 150 Fed. Rep. 122 111
Edison El. Lt. Co. v. Beacon, etc. Co., 54 Fed. Rep. 678, 189
Eibel Process Co. v. Paper Co., 261 U. S. 45 . . 200
Electric Mfg. Co. v. Edison El. Lt. Co., 61 Fed. Rep. 834 189
Elizabeth v. Pavement Co., 97 U. S. 126, 130 . . 64
Emerson & Norris Co. v. Simpson Bros. Corporation, 202 Fed. Rep. 747 . . . . . 185, 204
Expanded Metal Co. v. Bradford, 214 U. S. 366, 98, 101
Ferranti v. Harmatta, 273 Fed. 357 . . . 66, 68
Fireball v. Commercial, 239 U. S. 156 . . . 67
Gamewell Fire-Alarm Telegraph Co. v. Municipal Signal Co., 61 Fed. Rep. 948, 952 210
General Electric Company v. Cooper Hewitt Electric Co., 249 Fed. 61 120
General Electric Company v. Laco-Philips Co., 233 Fed. Rep. 96, 299 233
General Electric Company v. Morgan-Gardner Company, 168 Fed. Rep. 52 120
Hobbs v. Beach, 180 U. S. 383, 393 . . . 120
Howard v. Haywood, 1899 C. D. 8; 86 O. G. 184 . 238
Hoyt v. Slocum, 26 Fed. 329, 330 210
Kohler v. Kohler & Chambers, 47 O. G. 247; 1888 C. D. 19 236
Krementz v. Cottle, 148 U. S. 556 107
Lawther v. Hamilton, 124 U. S. 1 100
Leeds v. Victor, 213 U. S. 301 67
Loom Company v. Higgins, 105 U. S. 580, 591 98, 103
Mast, Foos & Co. et al. v. Iowa Windmill & Pump Co., 68 Fed. 213, 223 210
Mason v. Hepburn, 1898 C. D. 510 . . . 231
Matthes v. Burt, 1905 C. D. 574 231
Mead v. Brown, 1889 C. D. 173; 48 O. G. 397 . 237
Mowry v. Whitney, 14 Wall. 620 99

Page

Nicholas Power Co. v. C. R. Baird Co., 222 Fed. Rep. 933 205
Rubber Company v. Goodyear, 9 Wall. 788, 795 . 110
Saffert v. Mayer, 1902 C.D. 30; 98 O. G. 793 . . 238
Ex parte Schaeffer, 1896 C. D. 30; 76 O. G. 1118 . 237
Smith v. Goodyear Dental Vulcanite Co., 93 U. S. 486, 493 . . . . . 111, 208
Smith v. Nichols, 21 Wall. 112 85
Standard Sanitary Mfg. Co. v. J. L. Mott Iron Works, 152 Fed, 635 212
The Telephone Cases, 126 U. S. 1 188
Thayer v. Hart, 20 Fed. Rep. 693 206
Thomson Electric Welding Co. v. Barney & Berry Inc., 227 Fed. Rep. 428, ... 2, 40, 242
Thomson Electric Welding Co. v. Two Rivers Mfg. Co., 63 Fed. Rep. 120 86
Thomson Spot Welder Co. v. National Electric Welder Co., 260 Fed. Rep. 223 133
Thompson v. Weston, 1902 C. D. 521 . . . 231
Tilghman v. Proctor, 102 U. S. 707 . . . 101
Union Mfg. Co. v. Lounsbury, 2 Fish. 389 . . 238
U. S. v. American Bell Tel. Co., 167 U. S. 224, 228, 219
Warren Bros. Co. v. City of Owosso, 166 Fed. Rep. 309 209
Warner v. Smith, 1898 C. D. 517 231
Western El. Co. v. Sperry Co., 58 Fed. Rep. 186 . 120
Westinghouse v. Stanley, 138 Fed. Rep. 823 . . 67
Wicke v. Ostrum, 103 U. S. 461 111
John R. Williams Co. v. Miller Co., 107 Fed. Rep. 290, 292 120
Wintroath v. Chapman, 248 O. G. 1003 . . . 68
Wood v. Cleveland Rolling Mill Co., 4 Fish, P. C. 550 559 204



SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1922.

No. 589.

THOMSON SPOT WELDER COMPANY,
PLAINTIFF-PETITIONER,

v.

FORD MOTOR COMPANY, RESPONDENT.

BRIEF FOR PLAINTIFF-PETITIONER.

STATEMENT OF THE CASE.

This case is brought to this Court by writ of certiorari issued to the Court of Appeals for the Sixth Circuit.

The suit was brought by the plaintiff-petitioner alleging infringement by the respondent of Harmatta patent No. 1,046,066, for "Electric Welding" granted to the Thomson Electric Welding Company, December 3, 1912, on an application of Johann Harmatta filed December 3, 1903 (Vol. I, p. 387). There is no question as to plaintiff's title to the patent. The suit was brought in the United States District Court for the Eastern District of Michigan, Southern Division, which court (Killits, Judge) held the patent invalid, whereupon a final decree was entered dismissing the bill of complaint (Vol. I, p. 50).

Upon appeal to the Circuit Court of Appeals for the Sixth Circuit, that court, Circuit Judge Denison dissenting, affirmed the decree of the District Court dismissing

the bill upon the sole ground, as appears from the opinion by Circuit Judge Knappen (Vol. III, p. 2098), that in the opinion of a majority of the court the Harmatta patent was invalid for lack of invention and patentable quality. The majority of the court expressly refused to consider any other defenses than want of patentability. His Honor Judge Denison, by dissenting from the conclusion of the court, must have regarded all the other defenses, as well as that of want of patentable quality, as insufficient.

The decision of the Circuit Court of Appeals for the Sixth Circuit, here sought to be reviewed, is in conflict with a previous decision of the Circuit Court of Appeals for the First Circuit in the case of *Thomson Electric Welding Company et al.* v. *Barney & Berry, Inc.*, October 5, 1915, holding the same Harmatta patent valid and infringed (Vol. I, p. 4), 227 Fed. Rep. 428.

The single and exact issue upon which the case was decided in the Sixth Circuit adversely to the patent was on full hearing decided by the Court of Appeals for the First Circuit in favor of the patent. In each case the full state of the art was presented and in each case there was no doubt that the defendant infringed.

The invention of the Harmatta patent resulted in the production of welds, integrally uniting thin sheets of iron or steel in spots, such welds taking the place of rivets, riveting being the only method for uniting such sheets which was in use prior to the Harmatta invention. *The process and product*, whether patentable or not, *were absolutely new* with Harmatta. By the invention, for the first time it was possible to unite by an integral union and without rivets or solder, plane flat sheets of metal, laid one upon the other, at as many spots, located anywhere in their meeting faces, as might be desired.

No one, before Harmatta, had ever united two plane

sheets in this manner by any method of welding, electric or blacksmith.*

Professor Wagner, professor of mechanical and electrical engineering at Rose Polytechnic Institute at Terre Haute, Indiana, has testified without contradiction that

> "Harmatta struck out in a new field and accomplished something which had never before been accomplished by any method, namely, the welding together at isolated spots, and without previous preparation, parallel, superimposed metal sheets." (Vol. I, p. 343).

The patented process is applied to a greater extent each year wherever sheets are to be united, for example, in steel boxes, cases, tubes, the steel finish of buildings and railway cars, automobile bodies, cooking utensils, stoves, furniture and innumerable articles made of thin sheets of iron or steel (Vol. I, p. 62).

The petitioner has made and leased or sold to users in all parts of the United States upwards of 1,000 machines on which the Harmatta process of spot welding is carried out (see Pl. Ex. No. 11, "List of Licensed Spot Welder Machines"). Upwards of 2½ billion spot welds are made on these machines every year (Vol. I, p. 134).

The defendant, a large manufacturing concern, has infringed the Harmatta patent by practicing the process and producing the product of said patent without license. There is no question of infringement in this case.

*Lap welding of the edges of two sheets, as in the well known case of welding the lapped edges of pipes was known, but this, as we shall show, is in no sense spot welding.

THE ISSUE AND THE DEFENSES.

The sole issue is whether the Harmatta patent in suit is valid. That it has been infringed by the defendant has never been questioned in the lower courts and we assume that it will not be questioned here.

The validity of the patent is attacked on the following grounds:

1. That the subject-matter of the Harmatta patent is lacking in patentable quality as compared with the prior patented art. It is not contended that there is any single patent in the prior art which discloses Harmatta's invention. Whether these prior patents taken as a whole disclose or suggest processes which are so analogous to Harmatta's patented invention that the man skilled in the art would without the exercise of invention practice the Harmatta process and produce the Harmatta product is the main question in this case. We shall therefore discuss this defense first.

2. That the Harmatta patent was not legally issued in view of the Patent Office proceedings. This defense ignores the controlling fact that Harmatta's original application, filed December 3, 1903, fully disclosed every detail of the process and every characteristic of the articles described and claimed in the issued patent.

3. An alleged prior use by a man named McBerty. As we shall show, even on the admitted facts this defense is not substantiated. McBerty's use was at most a mere abandoned experiment. Further, as we shall show, the established facts contradict the possibility of any prior use by McBerty.

4. That the plaintiff is estopped to deny that a man named Rietzel was the first and original inventor of the subject-matter of Harmatta's patent. This defense is based on a mistaken view both of the facts and of settled

principles of law as we shall show. To us it is unintelligible.

5. That a man named DeFerranti was the original and first inventor of the subject-matter of Harmatta's patent. We shall show that there is no basis for this defense. It seems impossible that it should be argued by defendant.

figure marked "Pressing", whereby the plastic metal at the joint of the two articles to be welded is united into a weld which is a molecular union of the metal itself.

The current employed in electric welding is heavy, that is of high amperage, but of low pressure, that is of low voltage. It therefore requires conductors of low resistance in order to carry the current to the work. Copper conductors of large cross-section are therefore used in electric welding. When this heavy current is forced through parts which are of high resistance compared with the conductors it generates heat. If the current is heavy enough and the resistance is large enough the parts will be raised to a welding temperature, about 2400° F. One of the essential steps in electric welding is to force this heavy current carried by large copper conductors through the work under such conditions that the resistance of the work causes a welding heat to be developed.

In the Thomson welding process, in the form shown in his fundamental patents, the iron or steel pieces to be welded extending out from the copper electrodes are not only of greater specific resistance than the electrodes (iron and steel are much poorer conductors than copper), but they are of substantially *decreased cross-section*. They therefore offer great resistance to the passage of the welding current, which resistance is increased to some degree by the imperfect contact at the joint.

In the specific application of his underlying invention which Thomson described and illustrates in his original patents the cross-sectional area of the work at the welding point is made comparatively small so as to confine or concentrate the heavy current to a small cross-sectional path, the resistance of which causes the current to generate the welding heat at that point. This is in accordance with the well known electrical law that the resistance of a conductor increases with the decrease of its cross-

section, or as more commonly stated its resistance is inversely proportional to its cross-section.

As we shall show, every inventor in the art of electric welding before Harmatta developed his particular electric welding process on this principle and law, namely to provide *in the work itself* a restricted path of comparatively small cross-section and hence high resistance through which he forced the heavy welding current for the purpose of generating the welding heat.* Harmatta, as we shall show, in the process of the patent in suit departed diametrically from this method of handling an electric current and discovered a new method of concentrating the current which was in seeming contradiction to established electric laws (*infra*, p. 16).

The generic Thomson electric welding process had gone into wide commercial use as early as 1887, sixteen years prior to Harmatta's invention. It was employed mainly for "butt welding", as welding the abutting ends of two rods is called. It was used also for welding other pieces of metal together at the places at which they were held in contact, as described in several patents of the art prior to Harmatta, which we shall explain, but before Harmatta it was never used for welding two sheets of metal in spots where the weld performs the duty of a rivet or in any way foreshadowing the Harmatta invention.

The only way of securely uniting sheets of metal at any point in their contacting surfaces, known in the art before Harmatta, was by rivets. Soldering only stuck them together. Riveting involved making holes in the two sheets, thus weakening them, and inserting and heading the rivet. The finished article was made up of three separate things, namely, the two sheets and the rivet

*The Court will note that such is the principle of the later Rietzel patent discussed (*infra*, pp. 69 and 219).

with its two projecting heads. The Harmatta process of electric spot welding is vastly superior to the old riveting process and has largely superseded it as a method for uniting sheets of metal. When a weld is made by the process of the Harmatta patent it results in a strong and perfect union; no holes are made, the metal is continuous from one sheet to the other through the weld and the backs of the sheets are flat with no unsightly and objectionable projections such as rivet heads.

Harmatta's idea of welding two such plane sheets at any spot in their meeting surfaces was a new departure not only in electric welding but in welding by any method (Vol. I, p. 343).

Harmatta was the first to make an invention whereby two plane sheets of metal could as a matter of practical commercial business be united at any spot in their meeting surfaces otherwise than by rivets, bolts or solder.

THE PATENTABLE QUALITY OF HARMATTA'S INVENTION.

The reasons why Harmatta's process and product were patentable are:—

1. Harmatta produced a new result, namely a small round *weld* (a spot weld) uniting two plane sheets of metal at any place in their meeting faces. This was radically new.

The idea of such a weld was in itself a flash of inventive genius. No one had ever before thought of making such a weld, either by blacksmith welding or by electric welding. It was as radical an idea as that of putting the eye in the point of a sewing machine needle, Howe's invention that made machine-sewing possible, and as the constant contact of electrodes in a telephone transmitter, the so-called microphone, which is the basis of the success of telephony.

No case decided by this Court has ever denied patent-

ability to an invention, be it process, product or machine, which was based on such a radically new idea and which accomplished such a definitely new and valuable result.

2. To make this spot weld Harmatta manipulated the articles with which he dealt, namely the sheets, *in a new way* by indiscriminately superimposing one upon the other and he made his electrodes perform a function, which no electrodes, used in electric welding, had ever before performed.

3. In so doing he carried out *a new technical process*, that is, the electric current, which generates the welding heat, behaved and operated in an entirely new way, which was unexpected and indeed contrary to the teaching and experience of the prior art, and he applied the welding pressure to a condition, which seemed to make such application impossible.

THE HARMATTA INVENTION.

As shown in Fig. 1 of the patent (Vol. I, p. 387), Harmatta places the two sheets of metal, in practice generally not over an eighth of an inch thick, with their plane surfaces in contact, between two electrodes *a*, *b*, which have bodies of relatively large cross-section, but tapered ends, which bear upon the work with comparatively small facial area. Right here are two novel features in electric welding:—

First, although the overlap of the sheets is shown in Fig. 1 as small, *the sheets may be overlapped to any extent* as no feature of the process is affected in any way by the extent of the overlap of the sheets. This, as we shall show, is radically different from each and every process of the prior art in which the limited overlap of the contact area of the parts to be welded is an inherent and necessary characteristic of such old process in confining the current to the parts where the weld is made.

Second, Harmatta, by tapering the ends of his electrodes, for the first time in the art confined to a small definite path, that is "concentrated" or "localized" the welding current *solely by means of the electrodes* and without assistance from the arrangement or shape of the articles being welded, the size and contour of the weld being determined by the shape of the electrodes. Harmatta's electrodes, as we shall show, differed not only in shape but *also in function* from any electrodes of the prior art for in no process of the prior art was the current concentrated solely by the electrodes but was concentrated by the limited area of contact of the parts to be welded.

It was radically new in the welding art to place two metal sheets in indiscriminate facial contact over an area, the extent of which was immaterial, and to apply pointed electrodes to the opposite sides of those sheets to concentrate the current. No prior inventor had ever suggested doing this. This was a radically *new principle of operation* inherent in and necessary to Harmatta's invention.

This new principle of operation alone, because it dispenses with the necessity of a particular arrangement or shape of the articles being welded, has given his process great flexibility and adaptability to the welding of all kinds of thin metal articles.

With the work to be welded placed in position, Harmatta first grips the sheets between the electrodes, one electrode being on one side and the other on the other side of the spot to be welded, and at the same time passes an electric welding current from one electrode to the other through the work.

Harmatta *discovered* that under such conditions the current would not spread itself in the sheets and cross the joint between them over their wide area of contact, but that it would flow across the joint between the sheets

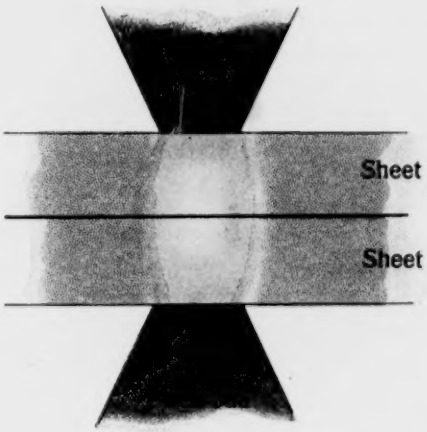
only at the path or spot in line with the ends of the electrodes. The resistance of this joint and of the metal of the sheets at the spot at which the current is concentrated, heats the sheets at this spot, and at this spot only, to a welding temperature as shown in the upper figure of the accompanying drawing in which the metal heated to welding temperature is shown in yellow, the less heated metal in red and the cold metal in blue.

The discovery that the current would thus be "concentrated" by the pointed electrodes and would confine itself to the path or "spot" between the ends of the electrodes was radical. This was a discovery of *a new function* to be performed by electrodes. There is no suggestion of any such phenomenon in the prior patents, as we shall show. In accordance with all known laws of electricity the resistance of a conductor, here the sheets, is inversely proportional to its cross-section, hence it would be expected that the resistance at the joint between the sheets, which is of any area however large, would be too small to create the heat necessary for welding. But contrary to such expectation Harmatta discovered that the heavy (high amperage) welding current of low voltage would not so spread itself but would stay in the direct path and cross the joint between the tapered ends of the two electrodes. Nothing of that sort was suggested or fore-shadowed by any item of the prior art. It was indeed contrary to the teaching of the prior art and a discovery of rare quality. It is the kind of "discovery" that is intended to be protected by the patent statutes and constitutes a real invention.

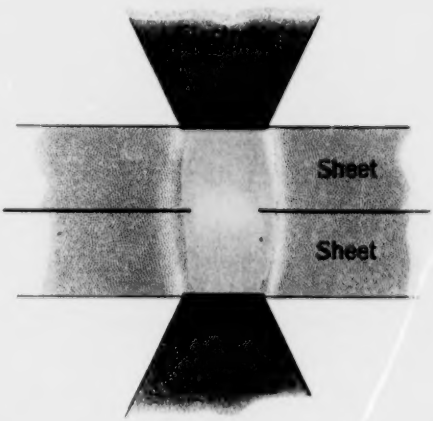
Harmatta then presses the electrodes toward one another as shown in the lower figure of the accompanying drawing. He is able to do this in spite of the already existing extended bodily contact of the sheets and their consequent relative immobility, because *the small ends of the electrodes bear upon softened metal only.* This was a

HARMATTA.

HEATING.



PRESSING.





radically new feature in electric welding; in each and every welding process of the prior art the parts to be welded are in contact over a limited area and as those parts become soft the pressure of the electrodes, which also bear upon cold unyielding metal, one at each side of those parts, squeezes the parts *bodily* together to make the weld. No such bodily movement of the sheets is possible or is carried out in the Harmatta process in which the sheets are in extended facial contact and therefore can not be moved bodily any closer together.

The movement of Harmatta's electrodes is only very slight. There is only a very slight indentation on the backs of the sheets on which the electrodes bear. This is a novel characteristic peculiar to the Harmatta process. No one before had ever made a weld with so little movement of the electrodes and disturbance of the metal. There is little or no extruded metal in a true Harmatta weld. The reason is that when Harmatta's electrodes apply pressure there is no place for the metal to go because the soft metal is surrounded as by a frame of cold unyielding metal, and therefore but a slight compression of the electrodes serves to force the hot metal together at the spot between the sheets to make a real weld just at that point and at that point only.

In every prior welding process the softened contacting parts are squashed together by the electrodes and the extruded metal squeezes out on each side of the joint. No such operation is possible or is carried out in making an Harmatta spot weld.

There is no suggestion in any patent of the prior art of such a small pressing movement of the electrodes or of the result accomplished, namely a small weld surrounded with cold metal and with only the slightest indentation on the backs of the sheets where the weld is made.

For the first time in the art of welding in general,

Harmatta welded together two plane sheets of metal at an isolated spot in their meeting faces.

For the first time in the art Harmatta produced a process by which metal sheets as a whole were united *in situ*, a weld being made without moving one sheet bodily toward the other. Only slight indentations in the backs of the sheets are made by the pressure of the electrodes on the softened metal.

The spot welding process of the Harmatta patent was first introduced into the United States in 1904, directly from Harmatta, by the purchase of a license for kitchenware and like articles by the National Enameling & Stamping Company, well known to be then and now the largest manufacturer of kitchenware in the United States, from the Essenhutte Silesia Company of Hungary, the owner of Harmatta's rights. The license, dated December 3, 1904, is in evidence (Vol. I, p. 433). With the license the National Company purchased two Harmatta spot welding machines which are now in its factory and have been in constant use up to the present time. Since then the National Company has built and used between eighty and one hundred spot welding machines (Vol. I, p. 125). Undoubtedly this extensive use of the Harmatta process and the sale of its products by the National Company beginning in 1904 spread the knowledge of Harmatta spot welding throughout the United States.

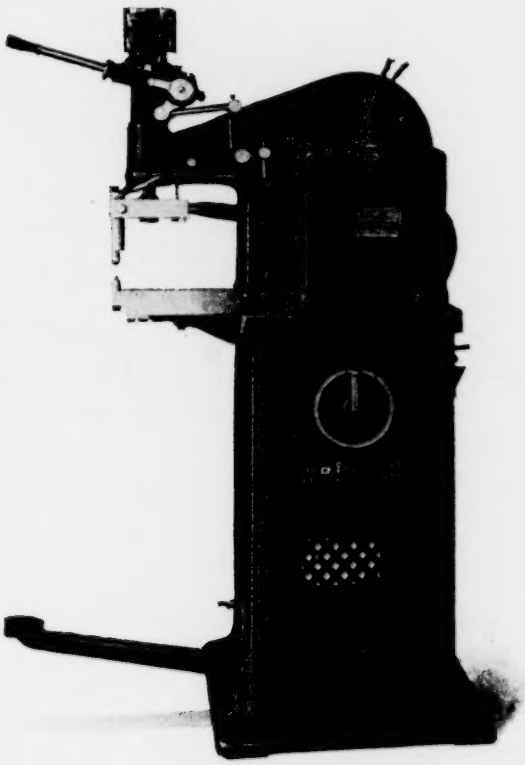
A TYPICAL SPOT WELDING MACHINE.

We show here Plaintiff's Exhibit No. 1, a picture of a spot welding machine used by the defendant. It is a typical spot welding machine.

In operating the machine the workman places the two sheets of metal face to face between the electrodes, which are shown extending from horizontal arms at the left of the machine and with their ends slightly separated from

PLAINTIFF'S EXHIBIT No. 1.

Defendant's Spot Welder.



one another. The sheets rest upon the lower electrode. He thereby locates the spot to be welded *at any desired point* in the plane meeting faces of the sheets (a possibility never attained by any one or by any process before Harmatta).

The operator then, either by the foot treadle or by the upper hand lever, presses the upper electrode down toward the lower electrode until the two sheets are held firmly between the electrodes at the spot to be welded. He turns on the current by a suitable switch and when the parts have been sufficiently headed he gives the electrodes an extra squeeze to complete the weld. He then cuts off the current and releases the work.

The operation is simple but requires a certain amount of skill, easily acquired by the operator, in turning off the current at the right moment and in operating the pressure devices.

THE NOVEL TECHNIQUE OF HARMATTA'S PROCESS.

As already stated, Harmatta's invention is radically new from at least three aspects.

First, the original *idea* of making a weld to take the place of a rivet at any place in the meeting faces of the plane sheets of metal.

Second, the idea of a new manipulation of the parts and elements involved, namely the indiscriminate placing of the two plane sheets face to face without regard to the place or to the extent of contact, and the use of pointed electrodes instead of the arrangement of the work itself to concentrate the current, and

Third, the discovery and invention of a new welding technique.

The First and Second above stated propositions need only to be stated to be understood and appreciated. The Third we will explain more fully.

In the accompanying drawing we have illustrated the

phenomena which take place in the Harmatta process of spot welding described by plaintiff's expert Gravell (Vol. I, pp. 61-63). In this drawing the size of the parts is exaggerated for purposes of illustration. The parts are shown in cross-section.

The electrodes *a*, *b* are pointed and press with their ends opposite to one another against the backs of the sheets which lie in facial contact.

The current, illustrated in dotted lines, is concentrated or localized in a narrow path through the sheets by the points of the electrodes.

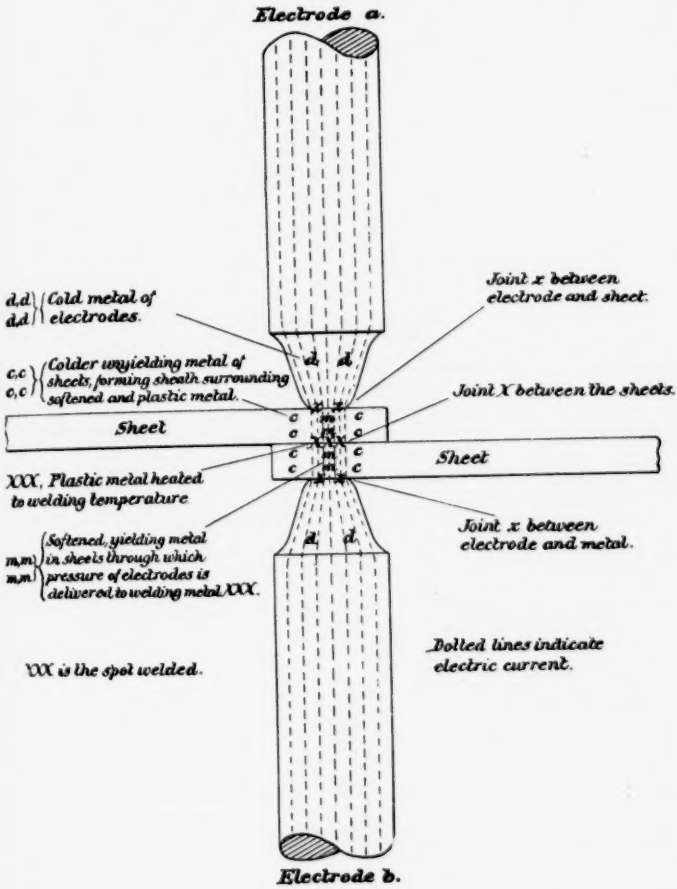
The surprising thing is that the resistance to the flow of the current in this path caused by the metal of the sheets does not cause the current to spread out in the sheets, and thereby take a wide path of less resistance. The resistance of these parts generates heat and, as the resistance is greatest at the joint, the greatest heat is there generated (Gravell, Vol. I, p. 85; Thomson, Vol. I, p. 540, Q. 59). As the resistance of the metal increases and its temperature rises another surprising thing is that this increase in resistance at the spot does not itself force the current to spread into the surrounding cold metal of less resistance, and thereby prevent the metal at the spot from ever reaching the high temperature necessary for welding.

Heat flows from the heated parts into the cold surrounding metal.

The metal in the sheets at the joint X, X, X between the sheets is soon raised to a welding temperature at which it becomes plastic and weldable.

The heat generated at the joints *x*, *x* is dissipated through the sheets and through the masses *d*, *d* of the cold electrodes so that the metal of the sheets near these joints does not rise to welding temperature but does rise to a high enough temperature to become somewhat soft and yielding. (If it rose to too high a temperature the electrodes

TECHNIQUE OF HARMATTA PROCESS.



and the sheets might become so soft as to prevent the transmission of the pressure of the electrodes to the metal at the joint X, X, X to be welded or the electrodes might even be welded to the sheets, or punch holes through them.)

The heat generated in the parts *m*, *m* between each electrode and the joint X, X, X and the heat flowing into those parts raise them also to a temperature at which they become soft and yielding.

The surrounding metal *c*, *c*, *c*, *c* in the sheets is of course heated by the flow of heat into it but not high enough to soften it or make it yielding. It is, as compared with the enclosed metal *m*, *m*, X, X, X and *m*, *m*, cold and unyielding.

The Harmatta process, therefore, creates this condition, namely plastic metal at the joint X, X, X heated to welding temperature at a spot at the joint between the sheets, which plastic metal is backed by soft yielding metal *m*, *m*, *m*, *m*, and all the softened metal is surrounded by comparatively cold unyielding metal, *c*, *c*, *c*, *c*. *This condition, for the first time created in the art by Harmatta, makes it possible to weld the metal together at the joint X, X, X without moving the sheets bodily towards one another.* No weld had ever been made before without moving the welded articles bodily towards or into one another.

In the Harmatta process the pressure of the electrodes is transmitted to the plastic metal at the joint X, X, X between the sheets by squeezing down firmly but slightly the soft metal *m*, *m*, *m*, *m*, back of the plastic metal, and as the unyielding surrounding cold metal *c*, *c*, *c*, *c* prevents any sidewise movement or escape of the soft and plastic metal in the two sheets, the plastic metal at the joint X, X, X of the two sheets is forced together to make the weld. The weld has substantially the same area as the ends of the electrodes.

This operation of pressing and moving only softened yielding metal by localizing the pressure thereon, without moving bodily the articles being welded, was absolutely new with Harmatta.

To state the matter more briefly:

In the Harmatta process an electric current is concentrated or localized solely by tapered electrodes in those portions of contacting metal sheets which lie between the electrodes. The resistance met by the current does not spread the current throughout the sheets but causes the metal adjacent to the joint X, X, X, between the sheets to heat to welding temperature and become plastic in spite of the dissipation of heat through the surrounding cold metal *c*, *c*, *c*, *c* of the sheets. At the same time the parts *m*, *m*, *m*, *m* of the metal sheets, lying between the metal at the joint X, X, X heated to welding temperature and the ends *x*, *x* of the electrodes, are heated enough to be soft and yielding. The pressure exerted by the electrodes acts only upon the yielding and plastic metal lying between the ends of the electrodes, all of which metal is confined in a comparatively cold unyielding metal sheath *c*, *c*, *c*, *c*, and thereby completes the weld without moving the sheets bodily towards one another.

A slight indication on the backs of the sheets shows the effect of the pressure of the electrodes on the softened metal.

PATENTABLE NOVELTY OF HARMATTA'S INVENTION BRIEFLY STATED.

Our discussion of the prior art will show, we submit, that from any one of three points of view there was patentable novelty in Harmatta's invention:—

1. *The idea of making a spot weld, i. e.*, a weld uniting two thin plane sheets of metal at any place or at any number of places in their meeting faces, which perfectly answers the purpose of a rivet.

2. *The idea of a new manipulation*, namely (*a*), placing those sheets in any kind of facial contact, without regard to the extent of that contact, and (*b*), using pointed electrodes to bear upon the work. This involved *the new idea of a new functional operation of the electrodes*, namely that of being the sole means of concentrating the current. In all previous electric welding it was the predetermined relative arrangement or shape of the two pieces to be welded which confined the current to a path of limited cross-sectional area, by which the resistance necessary for the generation of the welding heat was provided.

3. *The technique of the process*, as above explained, involving a new and unexpected behavior of the current and a new pressing effect produced under new conditions.

Harmatta's invention therefore involved *a new result*, the spot weld, *a new manipulation* of the parts to be welded, *a new function* of the welding instrumentalities and *a new technique* in the welding steps of heating and pressing.

PATENTS OF THE PRIOR ART.

The patents of the prior art relied on by the defendant to show lack of patentable novelty in Harmatta's invention, may be divided broadly into two classes: *first* those which describe processes and devices which are *not* electric welding, using that term in the sense of the art created by Prof. Thomson's basic patents of 1886, and *second* the patents which relate to electric welding (Gravell, Vol. I, p. 151).

The patents which are *not* for electric welding are as follows:

Benardos, No. 363,320 for arc welding.

Coffin, No. 437,571 and Benardos German patent No. 50,909 for hot resistor welding.

Thomson, No. 496,019 for soldering.

Blanchard, No. 466,266, Lemp 531,197 and Burton 647,694 for heating only.

Thomson, No. 396,015 for riveting.

All of these patents were set up in the answer and those of them which were considered at all pertinent were discussed in the Record in the Barney & Berry case in the First Circuit.

The patents on *electric welding* besides Thomson Nos. 347,140, 347,141, already discussed (*supra*, pp. 6–8), are as follows:—

Robinson 574,942 and Kleinschmidt 616,436 for butt-welding;

Thomson 444,928 and Lemp 553,923 for lap joint roller welding.

Perry 670,808 for cross-wire welding, and

Parkinson (British) 14,536 of 1894 for glut-welding.

All of these patents, with the exception of Robinson and Parkinson, were set up in the answer and referred to in the Record, as far as deemed pertinent, in the Barney & Berry case in the First Circuit.

The Robinson and Parkinson patents add nothing material to the prior art disclosed by the other patents.

The Harmatta patent itself refers to the butt-welding process (Thomson No. 347,140, and No. 347,141) the lap-joint roller welding process (Thomson No. 444,928, and Lemp No. 553,923), arc-welding (Bernardos No. 363,320) and hot resistor welding in which the heat is developed in resistance material and is imparted to the work by conduction (Coffin No. 437,571 and Benardos German patent No. 50,909). It specifically disclaims the method set forth in the Kleinschmidt patent No. 616,436, which is a species of butt welding.

The Patent Office allowed Harmatta's patent after due consideration of the Benardos United States patent, Thomson patents Nos. 444,928 and 496,019, the Klein-

schmidt patent, the Burton patent, the Perry patent and others not above referred to.

Not one of the foregoing patents suggests the idea of welding together at any point in their contacting surfaces two plane thin sheets of metal or of any way of manipulating the pieces to be welded or the welding instrumentalities so as to carry out that idea.

It is not contended, as we understand the defendant's position, that any single patent of the prior art anticipates Harmatta's invention (Dyer, Vol. I, p. 592, X-Q. 110), but the defendant's argument is that although Harmatta's spot welding was in fact absolutely new with him, the state of the art was such that no invention was required, and that a man skilled in the art needed no aid of an inventor to give the world this extraordinarily important and far reaching improvement in electric welding which takes the place of riveting in sheet metal work.

The best answer to this contention is the plain fact that no one prior to the date of Harmatta's application did practice that invention, large and important as was the field open for it. (The abandoned experiments of Rietzel and the alleged prior use by McBerty have, as we shall show, no anticipatory effect whatsoever.)

The facts established by this record are that in 1886 Thomson invented electric welding as disclosed in his patents No. 347,140 and No. 347,141. Thereafter this brilliant inventor, and others exercised their ingenuity and invention in efforts to apply the broad process of electric welding to many kinds of articles and to many arrangements of articles, but they all followed the specific application of electric welding which Thomson had invented in 1886, namely *butt welding* and variants thereof, and not one of them suggested the idea or solved the problem, or even attempted to solve the problem, of uniting by electric welding two plane sheets of metal at any point or

spot however remote from their edges, thereby obtaining a practical substitute for a rivet.

Harmatta was the first to solve this problem, which he did by *the process of the patent in suit which has methods of operation which are the antitheses of those of the processes prior to his invention.*

Harmatta's invention was based on the broadly novel idea of welding together two thin *plane* sheets of metal *at any spot* in their meeting faces. No one had ever before thought of doing that by any method.

Harmatta's invention marked an epoch in the art of electric *welding* and opened the tremendously wide and valuable field of uniting by electric welds two sheets of metal *at any point* in their contacting surfaces. The process has gone into the widest possible use in the manufacture of all kinds of sheet metal articles. The defendant has used it and cannot deny its utility.

Under these circumstances it would seem hardly credible that the practice of the Harmatta process was, prior to his date of invention so far suggested by the patents and practice of the prior art that the man skilled in the art without the exercise of invention would be naturally led to practice this new and immensely valuable process. He certainly did not do so.

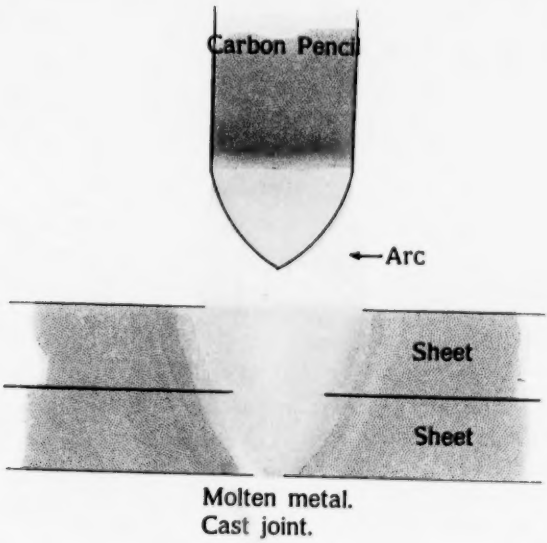
The undisputed facts therefore indicate most emphatically that Harmatta made a real invention, a real advance in the art of electric welding which was patentable under the laws of the United States.

The Court of Appeals for the First Circuit, appreciating these facts, has found that the Harmatta patent is valid. Vol. I, p. 4. We confidently submit that this Court will see no reason to depart from the conclusion reached by that Court of Appeals although a majority of the Court of Appeals for the Sixth Circuit took the opposite view in this case.

BERNARDOS No. 363,320.

HEATING BY ELECTRIC ARC.

NO PRESSING.



Molten metal.
Cast joint.

BENARDOS PATENT No. 363,320, MAY 17, 1887
(Vol. II, p. 1030).

This patent does not describe electric welding (Gravell, Vol. I, p. 151). It describes *an electric arc process of melting metals*, which can be used for melting together parts of two metal plates. As shown in Fig. 2, one of the terminals of an electric circuit is connected to the plate r, which lies upon the plate r^1. The other terminal is connected to a carbon pencil D. The patent states (p. 1, lines 87-93):—

> "When the carbon D, under these conditions, is brought into proximity to the metal to be operated on, the voltaic arc will be produced between the two, with the effect of heating, softening, and finally *melting* the metal at the point where the arc meets it."

That is, the metal is melted from the back of the superimposed plate down through the two plates until the metal runs together and a cast metal joint is made. The same effect could be produced by an ordinary blow-pipe or plumber's torch acting upon the back of the sheets of metal laid together. *The metals are not welded*, because they are melted and there is no pressure applied to the sheets in contact. Welding requires pressure as well as heat. Pressure is an essential characteristic of the Harmatta process. These melting or fusing processes are not welding.

No one would ever think of trying to attach two sheets of metal together on their faces by this electric arc process, because the metal is necessarily melted, whereby the quality of the metal is destroyed and a hole is or may be made, and the backs or outside surfaces of the sheets are damaged and roughened by the flowing of the metal. The Benardos process begins by heating on the back surface of

one of the sheets. The characteristic of electric welding is the opposite, namely, that the heating is in the metal itself at the joint between the sheets.

In the accompanying drawing we have illustrated the electric arc process of Benardos. The arc between the pencil electrode and the metal sheet is of very high temperature and melts that portion of the sheet adjacent to it. The high heat is indicated by the yellow.

This Benardos patent, therefore, bears no resemblance whatever to the Harmatta process or product. The Benardos process is disclaimed in the Harmatta patent as follows (p. 1, lines 64-69):—

> "I disclaim those processes of fastening pieces of metal together in which the parts are heated and practically melted down by an electric arc generated on the back of the piece by 'drawing' an arc by means of the electrode."

GERMAN PATENT TO BENARDOS No. 50,909, OF 1890 (Drawings Vol. II, p. 1151, Translation, Vol. I, p. 423).

Following the quotation just made from the Harmatta patent, Harmatta continues and says that he also disclaims (p. 1, line 70)—

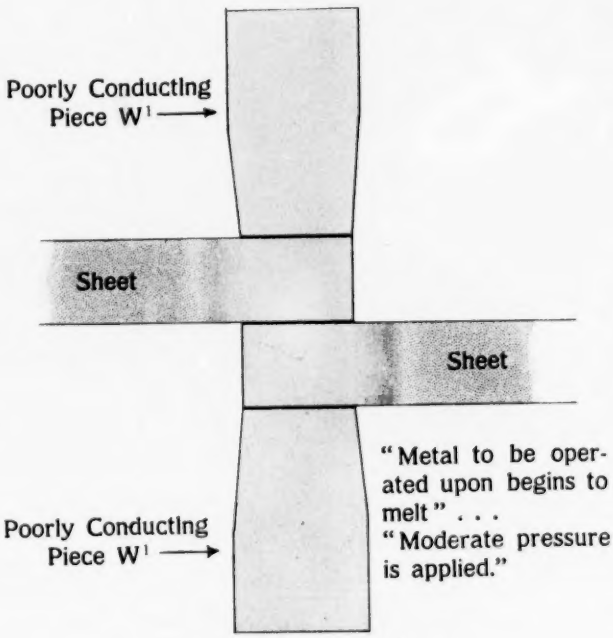
> "other processes in which the welding heat is generated externally and electrically in a resistance material and is imparted to the work by heat conduction from said resistance material in contact with the work."

This is the process of the German patent to Benardos of 1890 (Gravell, Vol. I, p. 155).

Fig. 1 of this patent is typical. It shows one terminal of an electric circuit at the plate A^1, which is superimposed upon the plate A, the edges of the plates overlapping. The other terminal is connected by a suitable handle to a piece of resistance material *w*, which is described in the patent

BERNARDOS GERMAN No. 50.909 — 1889.

HOT RESISTOR HEATING.



A cast joint is made.
Solder may be used.

as "a small piece *w* of fire resisting, poorly conductive material". This handle and the piece *w* constitute a "soldering iron". When the current is turned on, the conductor *w* "soon begins to glow".

The process is described in the patent (Vol. I, p. 424, lines 10-17):—

> "By cutting resistance out of the circuit with the aid of a rheostat C, Fig. 1, *the temperature of the piece w is raised until the metal to be operated upon begins to melt.* Then, while moderate pressure is applied, either the electric soldering iron is moved along the seam to be produced, or else the metal piece to be operated upon is moved along under the stationary soldering iron. When the operation has been completed, the current is interrupted by a switch and then the soldering iron is removed from the metal."

The process of this German Benardos patent is not electric welding, but is fusing by electric heating, and differs from the United States Benardos patent No. 363,320, above discussed, in applying the heat by means of highly heated resistance pieces *w* applied to the backs of the metal sheets to be fastened together instead of by means of an electric arc.

In the accompanying drawing we have illustrated this heating process of the Benardos German patent. The current is conducted through one piece W^1, through the overlap of the sheets and through the other piece W^1; the supply wires are not shown in the drawing. The heat is created in the resistance pieces W^1 by their resistance to the passage of the electric current and is conducted from these pieces to the work.

The German patent distinguishes the process therein described equally from the electric arc welding process of the United States Benardos patent and from the electric

welding process of Thomson, saying (Vol. I, p. 423, 3d paragraph):—

> "*This process is clearly distinguished, both from the point of view of the inventive idea on which it is based and from that of its mode of operation*, from the prior Benardos process of working metals by the direct employment of the electric arc, as well as *from the electric welding process of Elihu Thomson.*"

The Benardos patents, both United States and German, do not relate to electric welding. They contain no suggestion of the idea of making a weld at a spot between two contacting pieces of metal that can take the place of a rivet. These patents are not pertinent to Harmatta's invention.

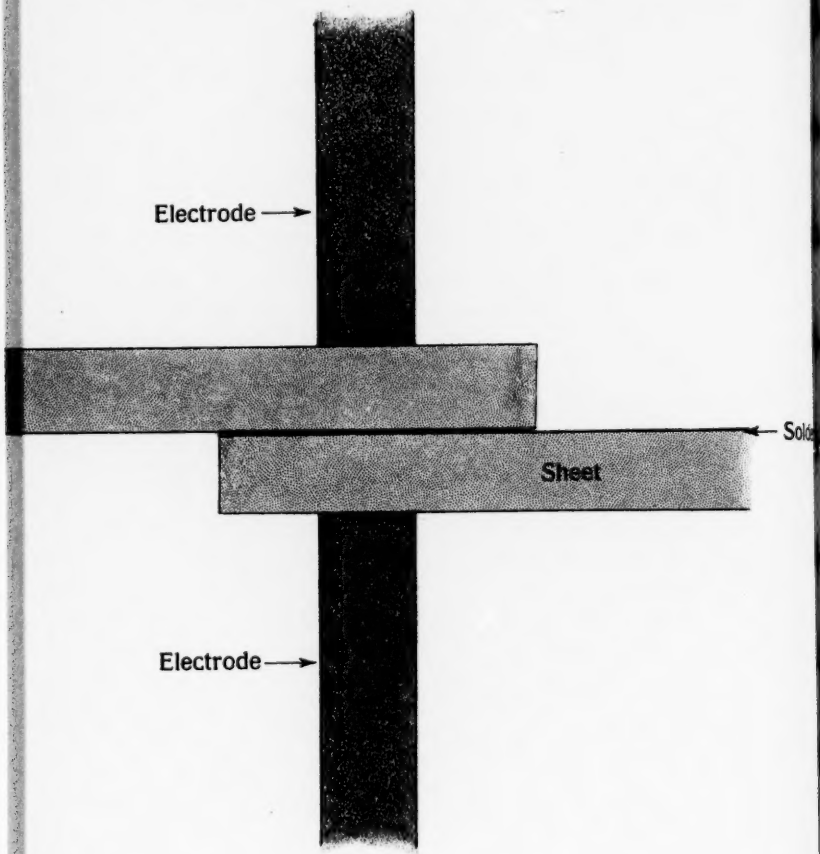
COFFIN PATENT No. 437,571, SEPTEMBER 30, 1890 (Vol. II, p. 1045).

This patent does not describe a method of electric welding (Gravell, Vol. I, p. 154). It describes a method of heating the ends of two abutting rods held between two anvil blocks of carbon D, D^1 by passing currents of electricity through the rods and through one of the carbon blocks. The idea is to heat the ends of the rods without passing the current directly from one rod to the other. Coffin's object was apparently to avoid the butt-welding process of Thomson in which the current is passed directly from one rod to the other.

There is nothing in this Coffin patent that has any significance, even the most remote, to Harmatta's invention of spot welding.

THOMSON No. 496,019.

ELECTRIC SOLDERING. LOW HEAT. MODERATE PRESSURE.



THOMSON SOLDERING PATENT No. 496,019, APRIL 25, 1893
(Vol. II, p. 1053).

This patent is *not for electric welding* but for "Electric Soldering" (Gravell, Vol. I, p. 156). As the patent states (p. 1, lines 16-23):—

> "My invention consists in clamping or pressing the pieces together at the seam or joint, passing an electric current through either or both of the pieces to be joined, and in sufficient volume to *melt the solder* or uniting metal, cutting off the heating electric current, and maintaining the pressure until the joint is sufficiently cool."

The accompanying drawing illustrates this Thomson soldering process. The electric current flowing from one electrode to the other through the sheets heats them to a comparatively low temperature at which the solder (green) between the sheets melts. When the current is turned off the solder solidifies and thereby unites the two sheets. The solder does not form a weld but is simply a cement or metallic glue for sticking the two sheets together. There is no pressure involved, as in welding, but the sheets are simply held in position while the solder cools and solders them together. When the process is applied to tin plates the tin on the surface of the plate may form the solder (p. 1, lines 12-16).

There is no electric welding and no isolated spot weld is formed. There is no suggestion that two sheets of metal can be electrically *welded* together at isolated spots.

As shown in Figs. 1 and 2, the overlapped edges of two sheets to be soldered together are held between the large electrodes C and C^1 and the solder is melted between their entire areas in contact.

Fig. 3 shows a double lap joint, the parts of which are soldered together.

Figs. 4, 5 and 6 show the soldering together of a round plate P "struck up into form" (p. 2, line 30) and a ring piece P^1 with one edge turned in. The pieces are forced together by the blocks C, C^1 "which may be of iron or other metal" (p. 2, line 37), but Thomson prefers to "face them with a facing such as hard carbon" (p. 2, line 41) in order to concentrate the heat. The facing with hard carbon is shown in black in Fig. 7. This is the same idea as in the Benardos German patent already discussed, namely that of heating the sheets from their backs by means of hot resistance pieces.

Thomson developed the idea further, as shown in Figs. 8 to 17, wherein the ends F of the pressure pieces are provided with small projections, the patent stating:—

> "In all these cases the conduction of heat away from the pieces held between the blocks is greatly checked by the form given to the surfaces as described, and the resistance to the passage of current at the work is increased which in itself results in further production of heat at the sheet metal pieces where pressed up together between the conducting blocks C, C^1." (Page 2, lines 76-85.)

Obviously the heat generated by the small projections and conducted to the work is applied to the back of the pieces to be soldered and would pass through the sheets and melt the solder wherever the heat was great enough. There is no idea here of an isolated spot weld or even of an isolated spot of solder.

Fig. 19 of the Thomson patent shows the pieces P, P^1 rolled together between rollers C^2, C^3, the peripheries of which are grooved as shown in Fig. 20.

Figs. 21 and 22 show a gang soldering machine operating

upon many pieces "in a given time" (p. 2, line 118). A cam S on a shaft D forces down a rod C to clamp the pieces P between its lower end and the upper end of a rod C^1. The continued downward movement of the rod C brings the lower end of the lower rod C^1 into contact with a terminal spring *a* which is connected to the conductor K^1 from the source of electric energy. The upper rod C slides against a spring contact piece connected to the conductor K. As the cam S continues its movement the springs on the rods lift the rods and break the contact between the lower rod and the spring terminal *a* thereby cutting off the current. The continued upward movement of the upper rod C, which is permitted by the cam S, lifts that rod from the soldered pieces P.

There is nothing in this mechanism or mode of operation in the least degree suggestive of spot welding. The solder between the pieces is undoubtedly spread over the entire area of contact of the pieces and would not even form a spot of solder. The electric conductors or electrodes C, C^1 are straight sided rods which would serve neither to carry a current large enough for welding nor to concentrate it at the ends of the rods to a path between those ends only, as are the functions of the taper ended electrodes of Harmatta's invention. Such straight sided electrodes as are shown in this Thomson patent might be suitable for electric soldering but they would be utterly useless for electric welding.

Furthermore the electric contacts for closing the circuit would be unable to carry the heavy current necessary for electric welding.

This Thomson patent does not even teach the art how to make a soldered joint except throughout the area of contact of the pieces to be soldered. Even therefore if the arts of soldering and welding were in the least analogous, which they are not, this Thomson patent would be in no

way suggestive of Harmatta's idea of making a spot weld between the contacting surfaces of two plane sheets in extended indiscriminate facial contact.

This Thomson patent discloses only soldering operations. It contains no thought or suggestion that such a weld might be made at any place between two such plane sheets.

It offers no solution of the problem of how to concentrate a welding current at a spot in the meeting surfaces of two plane sheets in extended facial contact.

It offers no solution of the problem of how to apply pressure as is necessary in welding to complete the weld between two such sheets.

While soldering and welding both require the application of heat to the metals being treated they are in other respects in no way alike. Welding results in an autogenous union of the two metal sheets. Soldering results in the mere metallic gluing together of the pieces.

Welding requires a current sufficient to raise the parts to be welded to a temperature of 2400° F. Soldering requires a current sufficient to raise such parts only to a temperature of 400° F (Dyer, Vol. I, p. 599). The manipulation of a welding current for spot welding presents a very different problem from the manipulation of a soldering current. The former requires increased resistance at the welding point, provided by a marked reduction of the cross-sectional area of the work at that point as in the art prior to Harmatta, or provided by tapered electrodes as in the Harmatta process.

The soldering current requires no such concentration of resistance or concentration of current.

In the Harmatta process the ends of the electrodes, although small in area, are not the source (except as carriers of the welding current) of the welding heat which is generated at the joint between the work. In the Thomson soldering process in most of the figures of the

patent illustrating that process the ends of the electrodes are faced with carbon or are grooved or corrugated so that those ends shall offer material resistance to the current and become heated and thereby heat the work. This is the antithesis of Harmatta's idea of creating a welding heat solely at the joint between the two pieces to be welded.

In the electric soldering of the Thomson patent there is nothing in any way resembling Harmatta's method of applying pressure solely to the opposite sides of the spot to be welded. In Thomson the sheets or plates are not heated highly enough to make them soft and therefore the application of such pressure as is needed for soldering at most merely pushes those sheets bodily towards one another, if that can be done, by squeezing out some of the solder between the sheets.

The Thomson patent does not involve or suggest Harmatta's idea of completing a spot weld by pressing firmly but slightly on the softened metal on each side of the spot to be welded without the bodily movement of the sheets themselves.

This Thomson soldering patent No. 496,019 contains no suggestion of the electrode spot welding process of the Harmatta patent. Ten years elapsed from its date of issue in 1893 before Harmatta, who was the first to do so, thought of the electrode spot welding process.

BLANCHARD PATENT No. 466,266, DECEMBER 29, 1891 (Vol. II, p. 1051).

This patent does not describe a process of electric welding or even of uniting two pieces of metal. It is for an "electric heating tool" consisting of a pair of pincers, the ends of which are provided with electrodes *b*, *b*, between which the article to be heated, such as a rivet, is grasped. An electric current is then passed from one electrode to

the other through the article and thereby the article is heated.

This patent has no conceivable relevancy to the Harmatta patent in suit (Gravell, Vol. I, p. 158).

LEMP PATENT No. 531,197, DECEMBER 18, 1894
(Vol. II, p. 1058).

This patent is not for electric welding (Gravell, Vol. I, p. 159), or even for uniting two pieces of metal. It is for a "method of producing locally annealed steel plates" and shows a process of passing an electric current through a single steel plate at a place which it is desired to soften or anneal in the hardened plate. The current does not cross a joint between two plates or sheets.

The process has nothing whatever to do with electric welding, as no weld is attempted to be made, and is merely a specific example of the old process of heating an article by passing a current of electricity through it. It is entirely immaterial that in some cases the electrodes employed by Lemp are pointed, as for example in Fig. 4, because there is no suggestion or hint by Lemp that by such means an electric weld could be made between two thin sheets of metal in contact with one another. There is no hint of Harmatta's idea in this Lemp process.

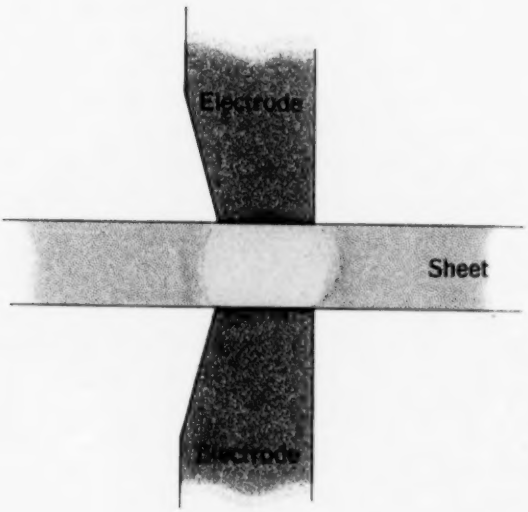
The process is illustrated in the accompanying drawing. The part colored red is that heated and softened.

BURTON PATENT No. 647,694, APRIL 17, 1900
(Vol. II, p. 1079).

This patent (Gravell, Vol. I, p. 161) is not for electric welding but for an "Electric Metal Working Apparatus" and shows means for electrically *heating* the ends of rods and other articles by means of passing electric current therethrough *so that they can be afterwards hammered together on a blacksmith's anvil*, which is illustrated at 110 in Fig. 1 of the Burton patent. As the patent states:

LEMP No. 531,197.

LOCAL ANNEALING.



No Welding.

No Pressure.

"The object of the invention is to provide a simple, convenient and compact apparatus for the use of a blacksmith or other metal-worker." (Page 1, lines 22-25.)

According to the described process, electrodes of various shapes are pressed against opposite sides of the work and a current is passed from one electrode to the other through the work, thereby heating it to welding temperature. In all cases where there are two pieces of metal or two ends of a ring or other kinds of pieces to be welded together, *the pieces of metal or the ends of the work are shown separated from one another and not as being pressed together by the electrodes.* The current does not cross the joint between the two pieces but divides and passes through the end of each piece separately. It merely heats the ends of the pieces, and there is no suggestion of forming a weld by pressing the work together by means of the electrodes. On the contrary, the patent states:—

"*As soon as the piece is heated to the proper temperature,* which may be ascertained by inspection thereof, *the operator releases the foot-lever* and the spring 170 lifts the hinged lever 150 and takes the upper electrode out of contact with the work, whereby the circuit is broken. *Then the operator may shove the work forward on the anvil and hammer the joint or otherwise finish it, as desired.*" (Burton patent, p. 2, lines 78-87.)

The release of the pressure when the work gets hot is the antithesis of the Harmatta process in which pressure is applied at that moment to make the weld.

The Burton process of heating is illustrated in the accompanying drawing. The ends of the work, which are slightly separated from one another, both rest upon the lower or bed electrode and are clamped thereto by the

upper electrode, which also is in contact with both ends. The current flows from one electrode to the other in two paths, one in each end of the work, and heats those ends to a welding temperature as shown in yellow. The patent describes no means for welding the two ends thus heated, but it suggests, as above quoted, that they may be removed to an ordinary anvil and hammered together. The Burton patent does not describe electric welding.

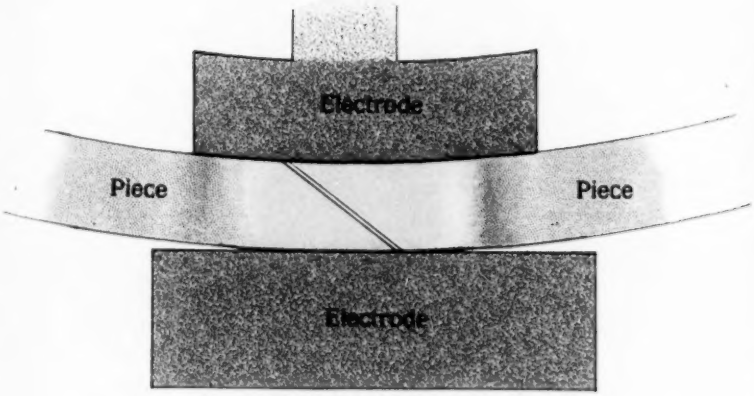
It is entirely immaterial that among the tools shown on the electrode head 200, there is illustrated a tool with spherical end 240 and a tool with a pointed end 250. There is no description whatsoever in the patent as to how these tools are to be used and no suggestion whatever that they could be used for making a spot weld or a weld of any kind. Figs. 3 and 4 show the use of the pointed tool entering a hole in a single sheet as if to spread and taper its mouth. Undoubtedly the spherical tool was intended for use for a similar purpose, which is not welding at all. In fact, as we have already pointed out, Burton's idea was merely to heat articles some of which were afterwards to be welded by the blacksmith on his anvil.

If either the pointed electrode or the spherical electrode were used in connection with the overlapped ends of the work they would not produce a weld even if the ends of the work, contrary to Burton's showing and expressed purpose, were in contact. The reason is that the end of the pointed or spherical electrode could contact with one end only of the work and as that end is also in contact with the bed electrode 100, the current, which follows the shortest and easiest path, would pass through that end only and would not cross the joint between the ends of the work and would not heat the other end. Therefore no weld could possibly result.

Even if the point of the pointed electrode or of the spherical electrode were placed precisely on the crack of

BURTON No. 647,694.

HEATING.



Ends of pieces are separated, i. e., not in contact.

Current traverses end of each piece separately; it does not cross the joint.

Pieces heated are removed to an anvil, and there welded by hand.

the joint between the ends of the work (which Burton does not describe or suggest), no weld would result because the current would split and pass in two branches, one through each end of the work to the bed electrode 100 on which both ends lie in contact as in the cases of the use of the large electrodes shown by Burton.

Moreover, the Burton patent does not describe or even suggest the application of pressure by the apparatus for the purpose of welding.

There is in the patent no disclosure or suggestion of spot welding. This patent was set up in the answer in the Barney & Berry case in the First Circuit, but was not thought of sufficient consequence to be discussed by the defendant's experts in that case. It has remained for the ingenuity of Mr. Dyer, defendant's expert in this case, to suggest reading into the Burton patent a description or suggestion of spot welding. No one, not even Burton himself, had thought of this before. There is no foundation for Mr. Dyer's suggestion.

THOMSON RIVETING PATENT No. 396,015, JANUARY 8, 1889 (Vol. II. p. 1037).

The patent (Gravell, Vol. I, p. 165) is not for electric welding but for a method of "electric riveting". It describes *the heating of a rivet* by passing an electric current therethrough between the anvil E^1 and the plunger G, which are in contact with the ends of the rivet and are the rivet setting tools. The rivet is headed by squeezing the rivet between the anvil and the plunger.

Another idea developed in this Thomson patent is that of partially welding the rivet to the sides of the hole. To accomplish this Thomson maintains the electric current through the rivet long enough to heat it highly so that enough heat is *conducted* from the rivet to the sides of the

rivet hole to raise the contacting metal to welding temperature. Then when the rivet is compressed and headed it is partially welded to the metal at the sides of the hole.

Concerning this operation the patent states:—

> "A valuable effect, (illustrated in Fig. 6) not possible in other processes, may be obtained in my method of riveting by continuing the heating on the rivet-blank placed in the hole for some moments longer than is necessary to raise it to a softening temperature. *By conduction* the heat is carried to the portions of the plate surrounding the rivet, raising such portions to a welding temperature, and when the rivet is pushed firmly into the hole *a partial welding of the rivet to the sides of the hole is effected*, thus forming practically solid metal for a portion of the distance from d to d^1." (Page 2, lines 28-41.)

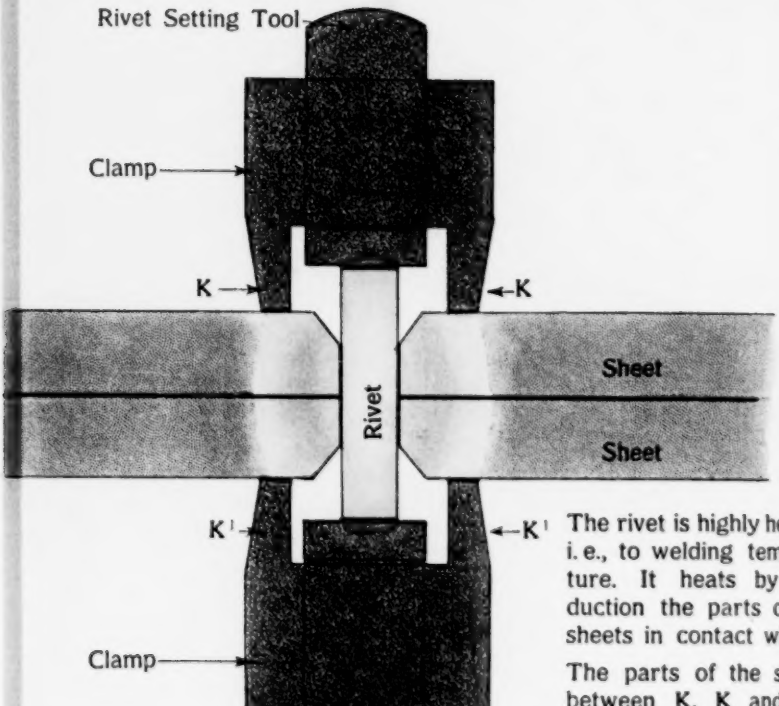
Thomson recognized that the squashing of the rivet between the anvil and the plunger would tend to separate the plates, and therefore provided clamps K, K^1 for holding the plates together, as shown in Fig. 9. The body of the clamp K is screw-threaded in the support B^1 so that the clamp may be screwed down onto the plates. Thomson provides mica pieces m, m^1 between the ends of the clamps and the plates in order to insulate the clamps from the plates. He, however, states that these mica pieces may be dispensed with and that part of the current of electricity may flow through the plates from one clamp to the other. The purpose of this is merely to assist the heating of the rivet and the parts of the plates in contact with it. Of this the patent states:—

> "By the use of this form of apparatus a heating electric current might be passed through the metal plates themselves at parts around the rivet by means of the pressure pieces or clamps K, K^1. Such current

THOMSON No. 396,015.

ELECTRIC RIVETING.

HEATING.



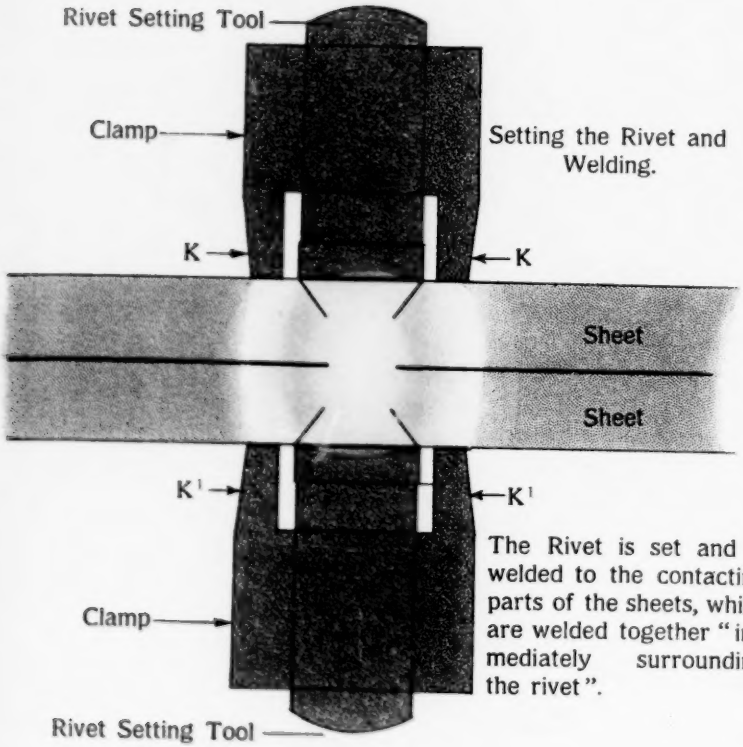
The rivet is highly heated i. e., to welding temperature. It heats by conduction the parts of the sheets in contact with it.

The parts of the sheets between K, K and K, K¹ are heated by the current, to assist the heating of the parts in contact with the rivet to welding temperature.

THOMSON No. 396,015.

ELECTRIC RIVETING.

PRESSING.



The Rivet is set and is welded to the contacting parts of the sheets, which are welded together "immediately surrounding the rivet".

No welding pressure is applied to the clamps.

would assist in raising the portion of the plates *immediately surrounding the rivet* to the welding temperature; but the prime object is that through the application of the pressure the plates themselves may be held together during the riveting. The blocks K^1, K may therefore be faced with mica or other insulator, m, m^1." (Page 2, lines 68-80.)

We have illustrated in the accompanying drawings the operation of welding the rivet to the metal at the sides of the hole while the plates are held firmly against one another by means of the clamps, in which operation part of the current flows from one clamp to the other.

The first drawing shows the heating effect by which the current passing through the rivet and overcoming the resistance thereof raises the rivet to a high temperature, as shown in yellow. The heat of the rivet is conducted to the metal at the sides of the hole, also shown in yellow. The current flowing between the clamps heats the metal at a short distance from the rivet, as shown in red, and this heat acts to assist the heating of the rivet and of the sides of the rivet hole, as Thomson points out.

Our second drawing shows the heading of the rivet. In this case the heads of the rivet are set into the countersunk holes in the plates and the body of the rivet, which tends to squash out sidewise under the riveting pressure, is welded to the metal at the sides of the hole.

Professor Thomson in his affidavit filed in connection with the Rietzel application accurately states of this process (Vol. III, p. 1786):—

"My prior patent No. 396,015 discloses the use of rivets and makes mention of welding but the only possible welding that could be produced by that process would be possibly some sticking of the edge of the perforation in the metal sheet to the side of the

rivet which is a mere incident of the invention and there is no welding of the superposed plane surfaces or opposed faces of the plates to one another by welds disposed over such plane faces."

Mr. Dyer, defendant's expert, seems to think that this Thomson patent in some way foreshadows Harmatta's invention. Inasmuch as *Thomson's idea was to insert a rivet* to unite two sheets of metal and *Harmatta's idea was to avoid the use of a rivet* and to unite such two sheets by means of a spot weld between the two sheets of metal, it is difficult to imagine two processes which could be more fundamentally antithetical to one another. Thomson had no idea whatever of any process in which a rivet could be dispensed with. *To dispense with a rivet was the fundamental thought of Harmatta.*

The defendant's suggestion, that by some totally unauthorized manipulations of the apparatus shown in the Thomson patent a spot weld might be made, are entirely irrelevant. This suggestion is based upon the supposed effect of the clamping devices K and K^1 of Fig. 9 if arranged and operated in a manner for which there is no warrant in the Thomson patent. Defendant's idea is that if these clamps were placed directly against the plates, after removing the insulation pieces m, m^1, and *if* their respective clamping points came opposite to one another, and *if* the right current of electricity were passed from one set of clamping points K through the work to the other set of clamping points K^1, there would be spot welds between the plates in their meeting surfaces at the spots in line with the opposed clamping points.

There is no hint of any arrangement or operation of this sort in the patent. Electrically the proposition is entirely unsound. When the pieces of mica m, m are removed it would be necessary to set up the screw clamp

S' to clamp the work between the arms K, K'. This turning of the screw would throw the clamping arms out of alignment and hence would prohibit the making of spot welds as suggested by Mr. Dyer. There is, moreover, no suggestion whatever in the Thomson patent that during the process the clamping arms are moved towards one another, hence *the pressure necessary for making a weld in line with the clamping arms (even if they were in line) would be lacking.* The only parts that are moved in the process of this Thomson patent are the electrode riveting tools G, G' which abut against the ends of the rivet. They are moved by the screws X, X' to set the rivet. The patent does not suggest that welds between and in line with the clamps might be made and none in fact could be made.

The uniting of the sheets and the rivet together by this Thomson process is not electric welding in any sense, because the heating of the plates is accomplished entirely by conduction of the heat from the heated rivet and not by the passage of current through the sheets as in electric welding.

The process further differs from that of the Harmatta patent in suit in the employment of a rivet as an essential instrumentality in the process which it was the object of Harmatta to dispense with, substituting therefor a spot weld. This Thomson process does not result in a spot weld and is not in any sense the process of the Harmatta patent in suit.

No one of the foregoing prior patents is for an electric welding process.

We now come to the patents on electric welding processes. No one of them even approaches the problem, solved by Harmatta, of welding together two thin sheets of metal *at any spot* in their meeting faces. That was a new idea first introduced into the art of welding by Harmatta.

THOMSON PATENTS Nos. 347,140 AND 347,141 of 1886 (Vol. II, pp. 1021, 1026).

These Thomson patents show and describe for the first time the process of electric welding, but they disclose only how it may be applied to joining together the *butt ends* of two metallic rods by passing an electric current of low voltage and high amperage from one rod to the other and pressing the two rods together. This specific process was of great value and went into commercial use, where the process became known as "Butt Welding".

We have fully discussed these patents *supra*, pp. 6–8.

THOMSON ROLLER LAP WELDING PATENT No. 444,928, JANUARY 20, 1891 (Vol. II, p. 1047).

Of the many patents in the prior art to which defendant has called attention this Thomson patent for roller lap welding is the one which has been especially emphasized.

In the suit of *Thomson Electric Welding Company* v. *Barney & Berry*, brought on the Harmatta patent in the United States District Court for the District of Massachusetts, particular reliance was placed on this Thomson roller patent by Judge Dodge in the District Court who found the Harmatta patent invalid for lack of patentable quality. The opinion of Judge Dodge is reported in 227 Fed. 428-433, see especially page 431.

The Court of Appeals for the First Circuit in finding the Harmatta patent valid and reversing the decree of the District Court also carefully considered this Thomson roller patent, saying 227 Fed. 435:

> "Returning to the defenses based on the roller electrode process, or other processes devised with reference to overlapping sheets, it is all too plain that neither in its practical operation nor in its result was there any resemblance to the spot welding such as to require discussion."

The majority opinion of the Circuit Court of Appeals for the Sixth Circuit in the case at bar lays particular stress on this Thomson roller welding patent as part of the prior art which the court regarded as negativing patentable invention by Harmatta. (Vol. III, pp. 2099, 2100).

The reason why this Thomson lap welding roller patent has attracted more attention than any other item of the prior art is clear. It alone of the disclosures of the prior art relates at all to the welding of plane flat sheets of metal and it is with the welding of plane flat sheets of metal that the Harmatta patent deals. But the resemblance between the two inventions begins and ends with this single and immaterial circumstance. The Thomson roller patent No. 444,928 is an application of the fundamental Thomson invention of electric welding to the *continuous welding of lap welded plates at their edges*, which had been done before by other methods of welding. The Harmatta invention relates to the application of the same fundamental principle of electric welding *to the isolated union of two plane sheets in spots* wherever there may be occasion to unite them which had never been done before by any method of welding. It substitutes electrically welded spots for the rivets that had been invariably used for such a union. The Harmatta principle and method of operation and its result were in all respects novel and not in the slightest degree foreshadowed in the disclosures of the Thomson lap welding roller patent.

Thomson's roller process was designed and adapted only for welding the lapped edges of sheets. This had previously been done, as in lap-welded pipe for instance, by ordinary blacksmith methods in which the edges of the sheets could readily be heated at a forge or by a plumber's torch or otherwise, then overlapped and hammered or rolled together into an integral weld. There was no difficulty in doing this.

But this did not instruct any one how to make an isolated weld anywhere in the meeting faces of two sheets. The only method that we can think of for heating the parts of such sheets to be welded would be to apply a plumber's torch to the spot in each sheet separately. The heat could not be applied to the sheets when placed one on top of the other, because there would be no way of applying the heat to the meeting faces of the sheets. Heating them from the backs would be inadequate and would result in merely melting holes in the backs of the sheets as we have explained as to the United States and German Benardos patents (*supra*, pp. 23–24).

Then having thus heated by a plumber's torch the spots in the sheets to be welded, it would be necessary to place those sheets face to face in the exact position so that the heated spots would come against one another. While the sheets were being so placed the heat from the spots would be dissipated. So that if an attempt were then made to place the sheets on an anvil and hammer the spot, it would be suprising if the metal remained at welding temperature long enough for this hammering to be carried out. Moreover, the backs of the sheets being of relatively cold metal might not yield sufficiently to the blows of the hammer to force the heated spots together into a real weld.

The welding of overlapped edges of sheets whether by blacksmith methods or by electrical methods therefore taught no one how to make a weld at any point, however remote from their edges, in the meeting faces of two sheets in undetermined extended facial contact.

This Thomson lap welding roller patent (Gravell, Vol. I, p. 175) describes a proposed process of lap joint welding between two wide roller electrodes. As above stated, the contentions based upon it, adverse to Harmatta, have been considered in every proceeding in which the Harmatta patent has been involved.

The patent was cited against Harmatta's application and was fully considered by the Patent Office (Vol. II, p. 1380, etc.).

In fact the process of this Thomson patent is referred to in the Harmatta patent itself (Vol. I, p. 388) as follows:—

> "It has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces.
>
> "A weld formed according to my invention is distinguished however from such prior welds, among other things, by the fact that the opposed surfaces available for uniting the pieces together and in which it might be possible to form a weld are welded in a small spot or spots only, the spot or spots being surrounded by comparatively large areas of opposed surfaces in which no weld is made." (Page 1, lines 42-56.)

The Thomson roller patent states:—

> "My invention relates to a process of electric welding in which *the surfaces to be welded* are pressed together to form a union, and the heating of the surfaces to the desired plasticity is effected by means of an electric current passed across the joint or line of proposed union." (Page 1, lines 8-14.)

The process so far stated is merely the butt welding process of Thomson's basic patents in which *the surfaces to be welded* are heated and pressed together.

The Thomson roller patent continues:—

> "My present invention relates more particularly to the process of joining or welding together strips, sheets, plates, or bars of metal where it is desirable to form a joint of considerable length, and is especially applicable to the welding of plates together at their edges, instead of riveting, to the welding of ribs or

> strips of metals to plates for the purpose of strengthening the same, to the formation of pipes by welding a longitudinal joint, to the welding of half-round or other shaped strips on one or both sides of a plate or strip of metal, and to other similar classes of work, as will be obvious." (Page 1, lines 15-28.)

All these suggested applications are of the same class and the same character. They involve the same idea, of which the specific example, relied on as suggestive of the Harmatta invention is "the welding of plates together at their edges, instead of riveting". Thomson is merely seeking to substitute a long continuous weld between the overlapped edges of plates for a series of rivets. This is not at all Harmatta's idea of forming a single weld, which would take the place of a single rivet, *made anywhere* between the meeting faces of two sheets or plates in extended contact. Thomson welded only at the overlap of the edges of the two plates. He could not weld at any other point.

The Thomson patent further states:—

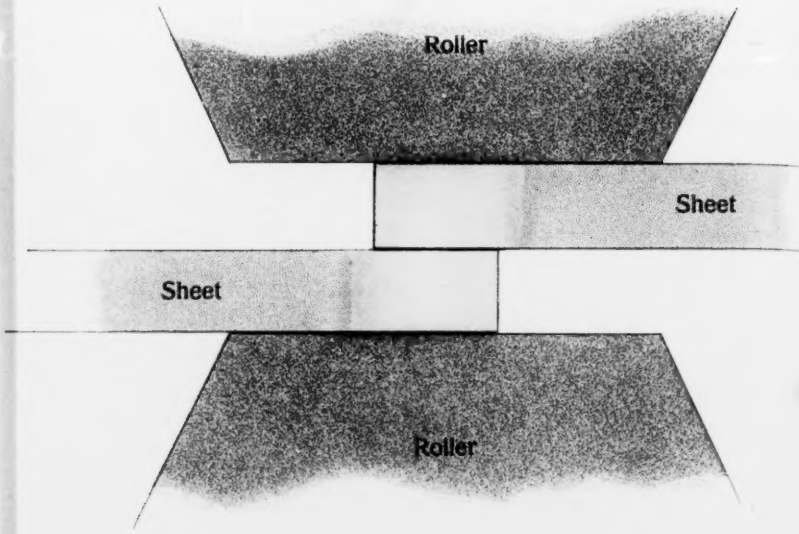
> "My present invention consists, essentially, of forming *an elongated joint* by the electric welding process by feeding the work in the longitudinal direction of the joint through suitable pressure devices, *the work being properly arranged*, so that the pressure devices will press the surfaces to be welded together and simultaneously passing an electric current through the work at the point of pressure." (Page 1, lines 29-38.)

As shown in the drawings of the patent the work is "*properly arranged*" by overlapping the edges of the two sheets or plates, as in cross-section in Fig. 1. The work so arranged is placed between two rollers R and R^1, the latter being forced towards the roller R by the screw S, the patent stating:

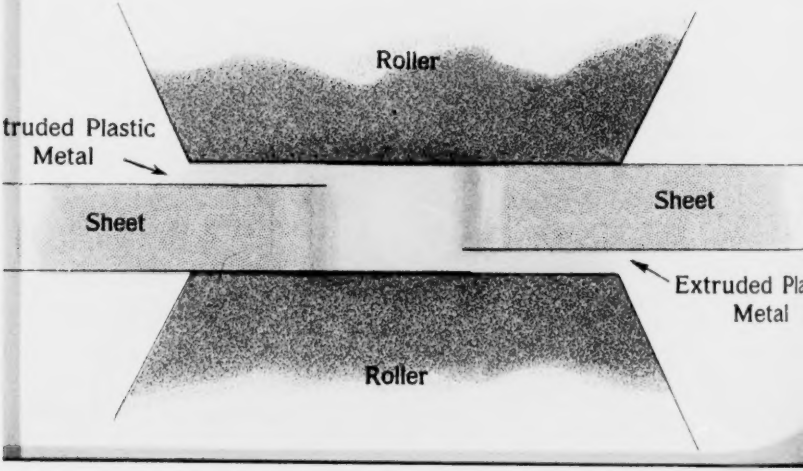
THOMSON No. 444,928.

ROLLER LAP-JOINT WELDING.

HEATING.



PRESSING.



> "The edges of the two plates are slightly overlapped, as shown, and the plates, being in position between the rolls, may be squeezed together by means of the screw S, thus forming an electric contact between them." (Page 1, lines 85-88.)

The essence of this arrangement of the plates and the electrode rollers is that the heavy welding current passing through the heavy conducting cables C, C^1, through the frames F, F^1 and through the rolls R, R^1 has traversed a path of low resistance but when it reaches the work it is forced through the comparatively narrow path formed by the overlap of the work itself and because this overlap is narrow, being much less than the width of the rollers, the resistance of this path is high. Hence the heavy current meeting this high resistance *in the narrow overlap* of the plates heats the metal of that overlap to welding temperature. This condition is illustrated in the figure marked "Heating" in the accompanying drawing.

The Thomson patent states:—

> "The electric current being now turned on as it passes from one roller to the other and across the point of pressure will heat the work to the welding temperature and soften the same slightly, after which the screw may be given a few more turns to effect a solid union." (Page 1, lines 88 to 95.)

The effect is illustrated in the figure marked "Pressing" in the accompanying drawing.

This is the same mode of operation which Thomson describes in his earlier basic patents, namely the contacting parts of the pieces to be welded (the overlap of the sheets or the ends of rods) are pressed together by large heavy electrodes. The current is forced across the narrow path provided by those contacting parts and there meets high resistance due to the limited cross section of those parts so that it heats those parts to welding temperature. Then

the pressure applied forces the pieces bodily together "to effect a solid union". All this was nothing but the method of the early Thomson patents applied to the welding of overlapped edges of sheets instead of to welding the butt ends of two rods. *In both cases the high resistance of the small cross-sectional path of the contacting parts of the pieces to be welded is what causes the current to create the heat necessary for welding.*

The Thomson roller patent then continues and describes the new feature of the roller process:—

> "The work, having been thus started, may now be moved along through or between the rollers, so as to bring successive parts of the joint into position to be pressed and heated at the same time. By this operation the metal will become thoroughly united as it passes through and out from between the rolls." (Page 1, line 94, to p. 2, line 7.)

That is, the rollers, having been brought closer together than the combined thickness of the two sheets, perform a sort of drawing operation on the edges of the sheets by pressing them bodily together as the sheets are forced between the rollers.

In this way Thomson proposed to weld together the previously arranged overlapping edges of two metal sheets.

In the Thomson process, it is absolutely necessary to maintain the extent of the overlap exactly right all the time. If the overlap is too great, its resistance will be too small and the current will not heat the overlapped edges sufficiently and no weld will be made. If the overlap is too small, the resistance will be too great and the current will overheat the overlapped edges, perhaps melting or burning them. To keep the overlap uniform is "almost impossible in commercial work" (Gravell, Vol. I, p. 176).

It may be noted that the welded seam back of the rollers is very hot and hence is of high resistance and thereby any tendency of the current to flow from one sheet to the other through the parts already welded is resisted. Also, as shown in Figs. 2 and 3 of this Thomson patent, which figures illustrate the process as it is being carried out, the sheets to be welded are shown as divergent as they are being fed to the rollers, so that in advance of the rollers there is no metal through which the current may flow. Hence the current is confined lengthwise of the seam to the parts being welded between the rollers by the high resistance of the hot metal back of the rollers and by lack of contact of the sheets ahead of the rollers.

It is confined crosswise of the seam by the limited extent of the overlap of the sheets.

Hence in the Thomson roller process the current is confined to the parts being welded by the arrangement of the work on three of the four sides, namely in both directions crosswise and in the direction ahead of the rollers. In the direction back of the rollers, it is confined by the high resistance of the adjacent highly heated metal.

THOMSON'S LAP WELDING ROLLER PROCESS A BUTT WELDING PROCESS.

As shown by our earlier discussion of the basic electric welding Thomson patents Nos. 347,140 and 347,141 (*supra*, p. 6), the butt welding process consisted of placing in contact *only those parts of the pieces* which were to be welded, thereby providing a path of limited cross-section and consequent high resistance for the passage of the current; then passing a heavy electric current through the restricted path provided by the parts in contact thereby heating those parts adjacent the joint to welding temperature; and then pressing or bodily forcing the two parts towards one another so as to complete the weld.

These steps, which are characteristic of butt welding, are carried out in the Thomson roller lap-welding process. *First*, the two plates are arranged in proper relation, namely with their edges slightly overlapped, thus providing a comparatively narrow and limited path of high resistance for the passage of the current; *second*, the current is passed from one sheet to another through that path, the current being confined thereto *by the arrangement of the sheets themselves*, and *third*, the two plates are forced bodily together by the rollers to complete the weld. The Thomson roller process is therefore a butt welding process.

The Thomson roller process was deemed patentable and the patent issued therefor because Thomson there dealt not with the butt ends of two metal rods, as in his earlier patents of 1886, *supra*, but with the overlapped edges of two metal sheets and because he employed rollers to make a continuous lap weld instead of merely forcing the ends of two rods together, as in those earlier patents.

But where in this Thomson patent is Harmatta's idea of making a single small weld, or a series of such welds, at any place in the meeting surfaces of two plane sheets of metal indiscriminately superimposed upon one another without regard to the extent of the area of contact?

There is no such idea in this Thomson roller patent and nothing that suggests that idea. Thomson's roller patent therefore did not disclose or suggest to anyone Harmatta's result, namely a spot weld perfectly answering the purpose of a rivet placed at any desired point.

The Thomson roller patent therefore is absolutely devoid of any trace of the first and most important element of Harmatta's invention, namely *the idea* of a spot weld between two plane sheets at any place in their meeting surfaces. It therefore can not in any sense be taken as suggestive of Harmatta's invention.

This should be sufficient to dispose of this Thomson

roller patent as an alleged disclosure or suggestion of the Harmatta invention regardless of any other considerations.

But suppose that Thomson or someone else had had the thought suggested to him that it would be a useful and desirable thing to make a weld at any place in the meeting surfaces of two plane sheets of metal, how would the disclosure of the Thomson patent aid him in accomplishing that result?

Thomson describes overlapping slightly two sheets at their marginal edges only and thereby confining the current to the overlap where the sheets are welded. This would not suggest to anyone the placing of two plane sheets, one on top of the other, in unlimited and unpredetermined facial contact without any regard whatsoever to the points at which they were to be welded together. Thomson therefore did not teach the manipulation or the possibility of the manipulation of plane sheets with which Harmatta was dealing and which is a characteristic of his invention.

Electric welding is based upon the idea of providing a high resistance to a heavy current at the place of welding. When the pieces to be welded are in contact over a relatively small cross-sectional area as in the Thomson roller patent, that arrangement by the very restriction of the path offered to the current provides the necessary high resistance. But if there are two sheets indiscriminately superimposed upon one another with an unlimited extended area of contact, as in the Harmatta process, a path of relatively great cross-sectional area is provided at the place of welding, *i. e.* between the sheets, for the passage of the current. That path of great cross-sectional area would therefore provide relatively small resistance. As high resistance is needed in electric welding, how is it to be obtained when the conditions seem to prohibit it? That was one of the problems solved by Harmatta, who solved it by a new functional use of pointed electrodes.

Did Thomson in his roller lap welding patent disclose or suggest the solution of this problem? Certainly he did not. He was not even dealing with that problem. He was adhering to the old idea of providing high resistance at the place of welding by limiting the cross-sectional area of the parts in contact. He had no notion whatever of how to provide the necessary resistance without such a restriction of contact of the work itself. Harmatta's problem of providing the necessary high resistance between sheets in unlimited unpredetermined facial contact was not approached, much less solved by Thomson. Without a disclosure of the way to solve that problem the Thomson patent is in no sense suggestive of the Harmatta process.

The Thomson patent describes the use of *roller* electrodes to make a continuous electric lap weld. This idea is not only lacking in suggestion of, but is positively antithetical to Harmatta's idea of a single weld made at any point between the meeting faces of two plane sheets of metal.

The Thomson patent describes *wide rollers* as his electrodes, rollers much wider than the overlap of the sheets to be welded. How are these rollers to be used to make a small round weld at any place between two sheets in extended facial contact? How could they make a weld away from the edges of the sheets? It would be impossible. No one has ever so made such a weld so far as this record shows.

Harmatta devised an absolutely new form of electrodes, namely, pointed electrodes to get his result of a spot weld by concentrating the current solely by the electrodes. Thomson's rollers could not do that.

The Thomson roller patent describes the completion of the weld by the bodily movement of the two sheets towards one another, with an incidental squeezing out of the metal, a characteristic of all welding known before Harmatta's invention. In the Harmatta process there is no squeez-

ing out of the metal. When two superimposed plane sheets are in extended facial contact, as Harmatta arranges them, they can not be moved bodily together. The Thomson roller patent sheds no gleam of light on the solution of this problem of applying the welding pressure without bodily moving the parts. Neither Thomson nor any one else in the art prior to Harmatta had even realized or attacked this problem, much less solved it.

To sum this matter up:—

1. The Thomson roller patent does not suggest Harmatta's radically new idea of a spot weld uniting two plane metal sheets in unlimited extended facial contact at any desired point in their meeting surfaces. Without this idea Harmatta's invention is non-existing.

2. The Thomson patent does not suggest the manipulation of the two sheets so that they be in extended facial contact which is a characteristic of Harmatta's invention, which no one before Harmatta ever suggested and which was a condition under which no one before Harmatta had ever thought that a weld was possible.

3. The Thomson roller patent does not suggest how to solve the problem of welding two indiscriminately superimposed plane sheets in extended facial contact at any point in their meeting surfaces. Thomson disclosed nothing more than the old butt welding idea of providing the necessary high resistance to the passage of the current by restricting the cross-sectional area of the parts in contact. He makes no suggestion of how to concentrate the current to a small spot in sheets in extended facial contact so as to heat only that spot to welding temperature. Neither Thomson, nor anyone else before Harmatta, had any conception of any way of providing that resistance or of preventing the current from spreading out all over two sheets in extended facial contact and passing between those sheets throughout the area of contact, whereby the

resistance to the passage of the current would be so low that no welding heat could be obtained.

4. The Thomson roller patent does not suggest the pointed electrodes, which are a new and essential means in the Harmatta process. Thomson's rollers could not be used, and never have been used to make a spot weld.

5. The Thomson roller patent offered no suggestion of a solution of the problem of how the welding pressure was to be given the parts to be welded without bodily moving the sheets together, which is impossible with two sheets in extended facial contact as in the Harmatta process. Harmatta solved that problem by the invention of a new technique performed by his pointed electrodes (*supra*, p. 15).

The Thomson roller patent therefore suggests neither the idea of making a Harmatta spot weld nor any ideas that would be useful in solving the problem of how to make such a weld.

Now that Harmatta has disclosed not only the brilliant and original conception of a radically new result, namely a spot weld between two plane metal sheets, but also the way to solve the technical problems involved in making that spot weld, the whole thing may seem simple. But it is no more simple than the idea of putting the eye in the point of the sewing-machine needle or the idea of the constant contact of the electrodes in a microphone, but it took the genius of an inventor to think of these revolutionary ideas and in Harmatta's case also patentable discovery and invention of high order.

The Court will look at Harmatta's invention from the point of view of the knowledge of the art as it existed before December 3, 1903, the date of Harmatta's application for the patent in suit. It will find nothing in that art descriptive or even suggestive of Harmatta's invention. It will find nothing of the kind in the Thomson roller

patent above discussed, which is that item of the prior art which has been regarded as more suggestive of Harmatta's invention than any other, only because it dealt with two sheets in lapped contact (but only at their edges) where the weld was to be made and therefore had a misleading superficial resemblance to Harmatta's sheets which were also overlapped or placed one on top of the other but were not to be welded for the whole overlap but only at selected spots. But the distinction that Thomson's overlap was limited in extent and position as a necessary feature of his process, while Harmatta's overlap is unlimited and its extent or position is utterly immaterial to the welding process, is of the utmost significance.

LEMP PATENT No. 553,923, FEBRUARY 4, 1896
(Vol. II, p. 1065).

This patent (Gravell, Vol. I. p. 178) illustrates and describes a scheme using rollers, as in the Thomson patent No. 444,928, for—

> "Forming of long joints between strips, bars, plates or rods—such as boiler plates or other articles which are at present riveted—by welding, soldering, cementing or similar operation" (page 1, lines 24-28),

and the invention consists—

> "In applying to the metal heating electric currents of different frequency during the manipulation thereof." (Page 1, lines 16-18.)

Lemp's idea was to pre-heat the work, which consisted of two strips diagrammatically illustrated in the drawings, by means of two or more alternating currents of different frequency. He used several transformers, shown for example in Fig. 3, and a number of contacts bearing upon the work and so arranged the polarity of his circuits that through a part of the work the currents flowed lengthwise

of the work and through other parts of the work it flowed crosswise between the electrodes. His entire object was *to pre-heat the work* so as to deliver it in a heated condition suitable for welding between the final pair of roller electrodes.

There was no suggestion in this Lemp patent of Harmatta's invention of welding together two sheets of thin metal at any spot or place in their contacting surfaces by means of pointed electrodes which concentrate the current and pressure at the spot or place to be welded.

There is nothing in the new features of this Lemp patent on which defendant bases any argument against the Harmatta patent. It is on Lemp's diagrammatic showing of an *old* process, in Figs. 1 and 2, that defendant relies. These figures illustrate two ways, described generally by Lemp, for welding two metal strips together by means of two pairs of roller electrodes D, D^1 and D^2, D^3, which can be used either to pass the currents longitudinally through the work or transversely between the members of the two pairs of electrodes D, D^2 and D^1, D^3. Lemp points out that neither of these arrangements is satisfactory because in the case in which currents flow longitudinally through the work the heat is created in the work midway between the two pairs of electrodes and the work between the electrodes is too cold for welding (p. 2, lines 10-24), and in the other case in which the currents are passed between the two members of the pairs of electrodes the heat created by the current between the first pair is lost before the work reaches the second pair of electrodes (p. 2, lines 25-40) and hence the process is ineffective.

Lemp himself, called by the plaintiff as a witness, further explained these old processes (Vol. I, p. 265):—

> "*Q.* 5. Referring now to Figs. 1 and 2 of that patent, which according to the specification illustrates an apparatus that might be used for welding in a

manner employed previous to your invention, please state what method previously employed is therein referred to and illustrated in these Figures Nos. 1 and 2.

A. The apparatus illustrated in Fig. 1 may be used for two different methods, the one illustrated in a previous patent by Professor Elihu Thomson for continuously lap welding sheets of steel or iron, and the other one employed by me for the same purpose or for welding strips of metal together, the difference between the two methods being that in the first the current is passed transversely, while in the latter the sheets to be welded are heated by currents passing longitudinally through the parts to be welded together, and being finally united by pressure, but without necessarily a current passing through the joint.

Q. 6. In those previous methods what was the relation of the electrodes to the overlapped sheets?

A. In both of these methods the electrodes would either entirely overlap the strips to be welded or completely overlap one side. These have particular reference to lap welded joints where the edges are covered by the electrodes proper.

Q. 7. When the methods were applied to welding strips, what was the relation of the electrodes to the strips?

A. The electrodes would completely cover the whole width of the strip or exceed it,—overlap it on either side.

Q. 8. In those old methods please state whether the parts welded together were welded over their entire contacting area.

A. Yes, they were.

Q. 9. State whether that is true of not only the old

methods referred to but to the methods embodying your invention and set forth in that patent.

(Objected to by Mr. Cushman that the patent is the best and only evidence of what is set forth in it.)

A. Yes, it covers both the old and the new.

Q. 10. How do you reconcile these facts with the showing of Fig. 2 of your patent?

A. The only way I can explain this discrepancy is an error of the draftsman at the time this illustration was made.

Q. 11. Has the method of your patent No. 553,923 gone into practical use?

A. No, it never went by the experimental stage."

Lemp's invention for which he took his patent consisted in combining the longitudinal flow of currents with the transverse flow of currents, either of which alone he states is inefficient, with the hope of obtaining sufficient heat by their combination. That is, as shown in Fig. 3 for example, a current of one frequency flows longitudinally in the work from D to D^1 and from D^2 to D^3, and a current of different frequency flows transversely through the work as from D^1 to D^3 and D^5 to D^4. *The object is to preheat the work* so that when it arrives at the point between the rollers D^4 to D^5 it will be so hot that the current from D^5 to D^4 will raise it to the welding temperature, and the weld will be made by the rollers D^4, D^5.

So far as this record discloses, Lemp's invention was no better than the prior processes which he condemned, and it never went into use and never made any impression upon the practical art. It is the opposite in all material respects of the practical and enormously commercially valuable spot welding invention of Harmatta.

At most the Lemp patent is no more pertinent than the Thomson roller patent which we have already discussed.

As the Thomson roller lap welding patent does not anticipate or render invalid the Harmatta patent, neither does the Lemp patent. Neither is in any sense an anticipation of Harmatta's invention.

ROBINSON PATENT No. 574,942, JANUARY 12, 1897 (Vol. II, p. 1070).

This patent (Gravell, Vol. I, p. 172) is for a "rail joint" and specifies the welding of a fish plate *provided with projections* to the side of a rail web. No method or apparatus is disclosed for accomplishing this result. Defendant's expert Dyer assumes that the man skilled in the art, if called upon to carry out this process, would apply large electrodes to the backs of the rail web and fish plate respectively, and pass an electric current from one electrode to the other through the fish plate with its projections and through the rail web.

A serious objection to this process is that the projection on the fish plate being small would heat rapidly, while the part of the rail web against which it abutted would heat slowly, because the heat would be conducted away with great rapidity by the metal of the rail web. The projection would probably melt before the rail web reached welding temperature and no weld could be obtained.

The process is merely a species of butt welding, namely an effort to butt weld the end of the projection on the fish plate to the rail web.

The Robinson patent contains no disclosure or suggestion of Harmatta's inventive thoughts, namely:

1. The idea of a weld between two *plane* metal sheets at any place in their meeting faces.

2. The idea of placing the sheets in unlimited and unpredetermined facial contact and of the use of pointed electrodes to concentrate the current in a path through the spot to be welded. In Robinson as in all processes of

butt welding the shape or arrangement of the pieces to be welded provided a path of small cross-sectional area in order to obtain the resistance to the passage of the current necessary to create the welding heat.

3. The idea of a new technique, namely, *a*, heating by a welding current delivered by pointed electrodes to a spot only between the meeting faces of two sheets in extended unlimited facial contact, that spot being entirely surrounded by comparatively cold metal, and *b*, pressing the heated metal to complete the weld without moving the sheets bodily together.

The process of the Robinson patent is therefore absolutely devoid of the characteristics of the process of the Harmatta patent and the Robinson patent contains no suggestion or thought pertinent to the Harmatta invention.

KLEINSCHMIDT PATENT No. 616,436, DECEMBER 20, 1898 (Vol. II, p. 1076).

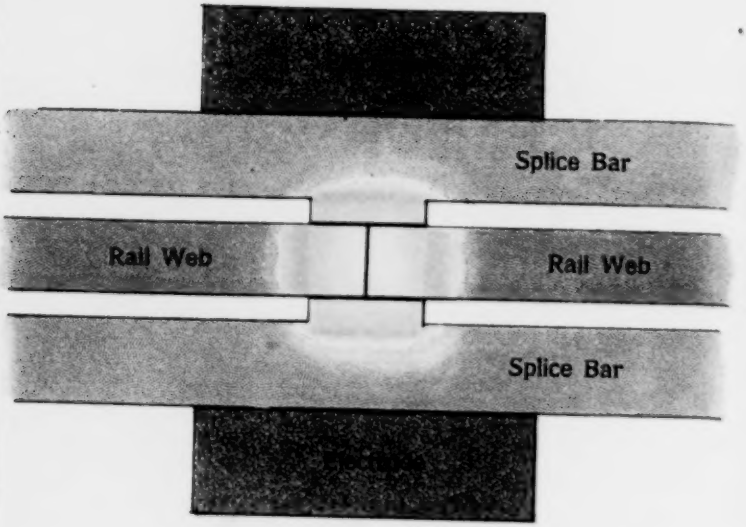
This patent (Gravell, Vol. I, p. 174) describes another process of welding projections on splice bars to rail webs.

The process is a butt-welding process. As shown in the patent, Fig. 2, for example, the splice bars are provided with projections. At each end of the splice bar is a flat projection of considerable area, and at the middle of the bar is a similar projection extending from top to bottom. Two splice bars equipped with these three projections are placed at the sides of the abutted rails with the middle projections opposite the joint between the rails, and with the projections at the ends of the splice bars opposite to one another and laid adjacent to the rail webs. Electrodes of much greater facial area than the area of the projections are applied against the backs of the splice bars opposite a pair of projections. Each splice bar is in

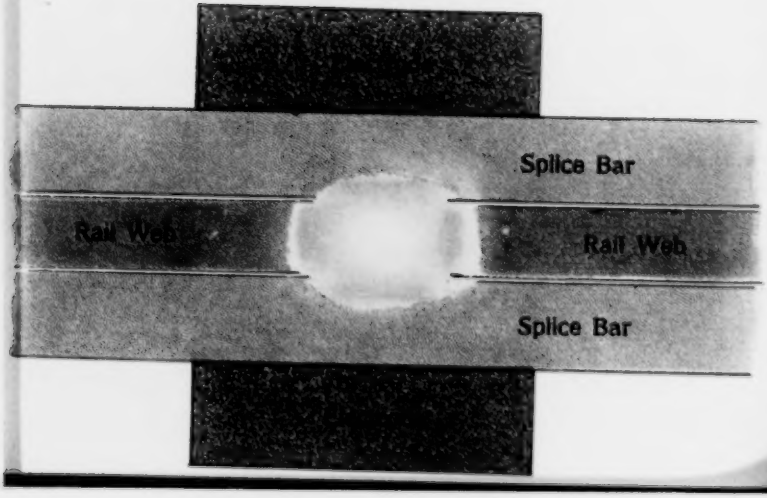
KLEINSCHMIDT No. 616,436.

PROJECTION WELDING.

HEATING.



PRESSING.



contact with the rail web at the projections only and not at any other point.

In the accompanying drawings we illustrate the Kleinschmidt process.

The first drawing shows the effect of the electric current which passes from one electrode to the other through the splice bars, their projections and the interposed rail-web. The path of the current is determined by the opposing projections on the splice bars. These projections and the portion of the rail-web lying between them are raised to welding temperature, as shown in yellow. The adjacent parts are raised to a lesser temperature by conduction of heat, as shown in red.

The second drawing illustrates the pressing of the parts together to form the weld. The splice bars are moved bodily against the rail-web and the projections thereon are welded to the rail-web with the usual squashing of the metal and its extrusion, which takes place in all butt welding operations of which this Kleinschmidt process is a species.

The Harmatta patent refers to the Kleinschmidt patent by name and number and says:—

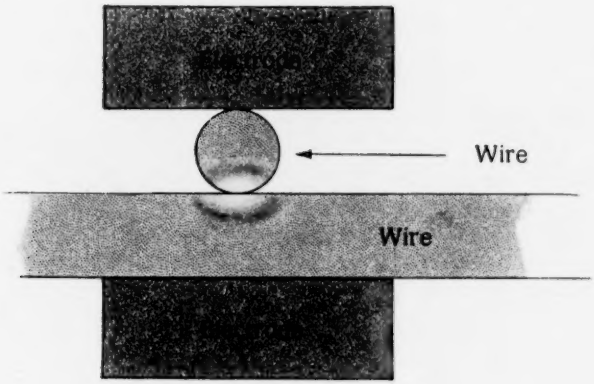
> "I . . . do not wish to be understood as claiming anything disclosed in said patent." (Page 2, lines 94-100.)

There is not in the Kleinschmidt patent the least thought of forming in flat sheets an isolated spot weld. There is not the least idea of placing two plane sheets in unlimited facial contact, nor of the use of tapered electrodes to concentrate or localize the electric current at that spot, nor of delivering the welding pressure to that spot by applying that pressure to yielding metal between the ends of the electrodes, whereby the metal to be welded

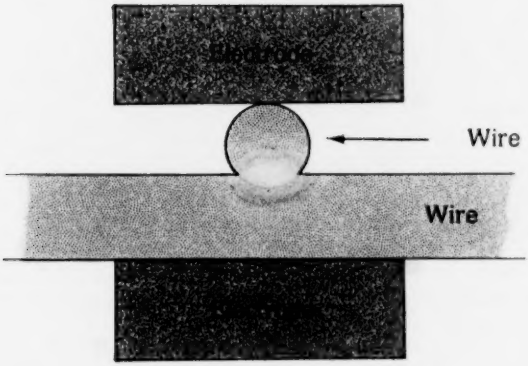
PERRY No. 670,808.

CROSS-WIRE WELDING.

HEATING.



PRESSING.



ent and the pressure in a spot surrounded by cold metal, as in the Harmatta patent.

On the application of the welding pressure the parts being welded are moved bodily toward one another and metal is extruded from the welded joint. These operations are the opposites of Harmatta's operations of pressing and moving only the softened metal and not moving the sheets themselves.

The accompanying drawings illustrate the Perry process.

The Perry patent is merely a specific example of a kind of butt-welding. The Perry process is in principle of operation and characteristics the opposite of the Harmatta process. It is absolutely immaterial.

PARKINSON BRITISH PATENT No. 14,536 OF 1894 (Vol. II, p. 1111).

This Parkinson patent (Gravell, Vol. I, p. 183) shows a machine for "*glut-welding*". A wedge-shaped glut piece C^{11} is forged to fit the curved triangular space between the corners of two adjacent triangular-shaped metal spokes F of a wheel. The purpose of the machine is to heat the glut piece and force and spread it into the space between the spokes and weld it to the spokes.

The glut piece C^{11} is pressed into the angle between two spokes by a contact block M. Contact arms L fit into the corners of the spokes in the inside. If a larger wheel is employed the contact arms L are provided with adjustable clamps L^1 to fit the radius of the larger wheel (p. 3, lines 6-9).

As shown in Figs. 1 and 2, the contact arms L are of the same height as the width of the spokes. Also the part of the contact block M which bears against the glut piece is of the same height, as shown in Figs. 4 and 5. By this means the contact blocks or electrodes M and L extend across the entire width of the pieces to be welded

together. This alone is entirely inconsistent with an Harmatta spot weld made *at any point* in the contacting area of two sheets of metal, however remote from their edges.

Parkinson employs an hydraulic ram B to force the contact blocks against the opposite sides of the work. The patent states:

> "The outward movement of the ram B carries forward the contact block M, which makes contact with the glut piece C^{11} and holds it firmly against the outer rim of the wheel C, at the same time bringing the contact arms L against the inner face of the wheel, thereby completing the secondary circuit through the part of the wheel C and glut piece C^{11} to be heated." (Page 3, lines 36-40.)

The heating current is maintained until the entire glut piece is softened. Then another hydraulic ram B^1, upon whose end are fixed two die pieces b, b^1 sliding through recesses in the block B, project these die pieces over the glut piece and spokes, thereby forming a "closed die" around the glut piece and spokes. Finally the full pressure of the ram B is applied and the glut piece is squashed and pressed against the spokes and welded to them over their entire area of contact.

The accompanying drawings illustrate first the heating of the glut piece and adjacent portions of the spokes to welding (yellow) temperature, and second the squashing of the glut piece and its welding to the spokes.

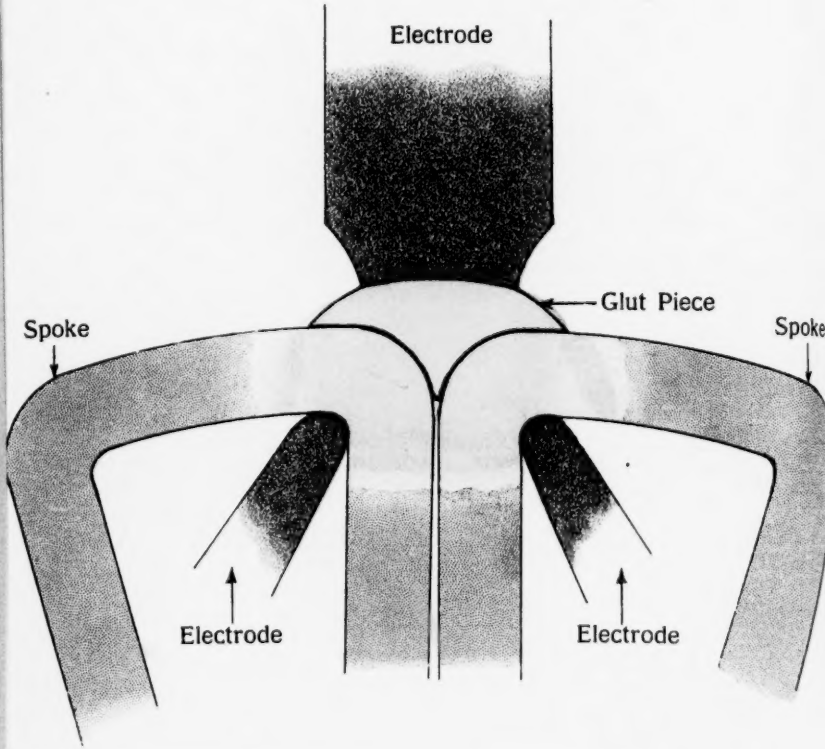
There is no hint or suggestion in the Parkinson patent of making a spot weld, or of any weld, less than the area of the pieces in contact.

There is no suggestion of welding two superimposed sheets of metal together at any spot in their meeting faces, however remote from their edges.

PARKINSON — BRITISH No. 14,536 — 1894.

GLUT WELDING.

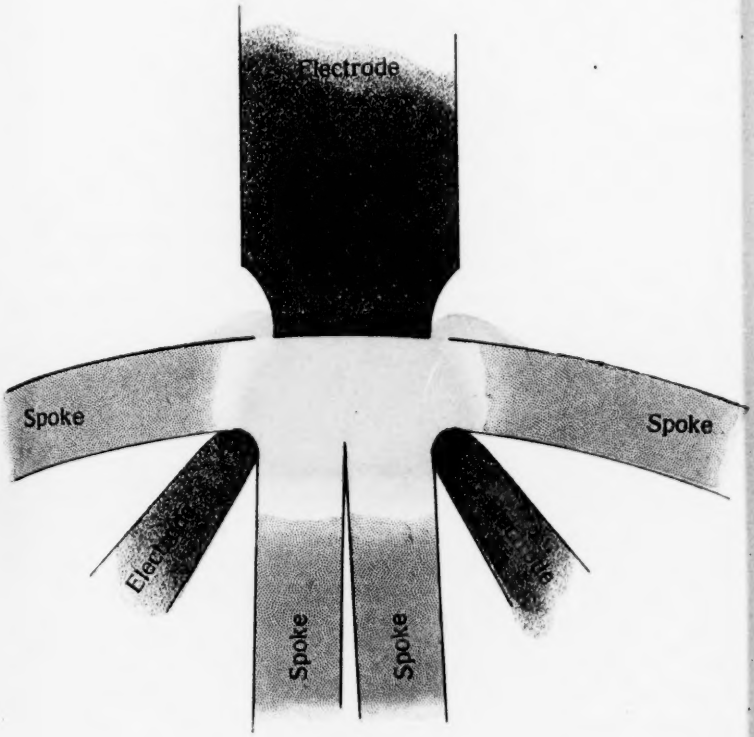
HEATING.



PARKINSON — BRITISH No. 14,536 — 1894.

GLUT WELDING.

PRESSING.



In Parkinson the current is not concentrated by the electrodes nor is the pressure for welding concentrated by the electrodes.

The soft welding metal is not surrounded by cold metal and the soft metal is spread during the welding process by the squashing of the glut piece against the spokes.

The glut piece is bodily moved against the spokes while being welded.

It is necessary to shape the glut piece to fit the recess between two adjacent spokes in preparation for the operation.

In all these respects the Parkinson process is the opposite of the Harmatta process.

The Parkinson patent was issued in 1894 and no one was inspired by its disclosure to practice Harmatta's invention of spot welding. The Parkinson patent is in every respect immaterial to the novelty and validity of Harmatta's invention.

The foregoing are all of the patents in the art prior to Harmatta's invention, and all, therefore, that need be considered by the court in determining the novelty and patentability of that invention.

FERRANTI AND RIETZEL.

In addition, the defendant has introduced evidence relating to the Ferranti British patent No. 11,921 of 1903, patented and published in 1904, and to the Rietzel United States patent No. 928,701, issued July 20, 1909, and to certain abandoned and immaterial experiments made by Mr. Rietzel in the year 1898. Although none of these things are to be considered as part of the art prior to Harmatta's invention, the two patents being of later date and Rietzel's work being merely an abandoned experiment, we shall discuss them at this point, because it seems well to answer here certain arguments made by the defendant to the effect that these things affect the novelty and patentability of Harmatta's invention.

FERRANTI BRITISH PATENT No. 11,921 OF 1903 (Vol. III, p. 1479).

The provisional specification of this patent was filed May 25, 1903. The complete specification was filed February 25, 1904, and accepted August 25, 1904.

As the Harmatta patent in suit was applied for December 3, 1903, the Ferranti British patent is not a reference, that is, it is not part of the art prior to Harmatta's invention, for it was not published or patented until after the date of Harmatta's United States application.*

Even if the Ferranti patent were part of the art prior to Harmatta's invention, it would not anticipate that invention or limit the scope of Harmatta's patent (Gravell, Vol. I, p. 318). The Ferranti patent describes a species of butt welding in which the butt end of a turbine blade, crescent-shaped in cross-section, is to be welded to the face of the turbine disc.

Ferranti realized that, as the turbine disc was large and

**Elizabeth* v. *Pavement Co.*, 97 U. S. 126, 130.

massive compared to the turbine blade, its mass would dissipate the heat created in the disc by the welding current so that the disc could not be raised to a welding temperature at the same time as the end of the blade to be welded thereto. He therefore states:—

> "The invention, therefore, consists broadly in adjusting the volume of metal of the disc in the neighborhood of the welding point so that approximately equal heating occurs in both faces to be welded, whereby turbine wheels with welded blades may be reliably produced in an inexpensive way." (Page 1, lines 16-19, Prov. Spec. Vol. III, p. 1479.)

Ferranti therefore modified the face of the turbine disc by cutting grooves crosswise, longitudinally or crisscross or by boring holes therein with the effect of forming small projections on the face of the disc. He also suggests reducing the volume of the turbine disc by boring holes into the edge of the disc.

As he states in both his provisional and complete specifications:

> "The object to be kept in mind in this as in other modifications is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficient areas untouched to ensure due mechanical strength in the welded joint." (Page 1, lines 28-31, p. 3, lines 33-36.)

After thus forming projections on the face of the turbine disc Ferranti proposes to butt weld the end of the turbine blade to those projections.

The process is a pure butt welding process, like the Kleinschmidt and Robinson processes already discussed,

in which a metal piece is welded to the projections on another piece. It has none of the characteristics of the Harmatta electrode spot welding process described in the Harmatta patent. The Ferranti welding is in no sense the substitution of a weld for a rivet. *The current and pressure are not concentrated by electrodes* in a spot between the meeting faces of two plane sheets in facial contact, as in the Harmatta process. In the Ferranti process the current and pressure are *concentrated by the work*, namely, the projections on the face of the disc and the turbine blade itself. *The Ferranti welds are made throughout the areas of the parts in contact. The parts move bodily towards one another under the welding pressure and there is extrusion of metal.* The process suggested by the Ferranti patent is therefore not anticipatory in any sense of the process of the Harmatta patent in suit.

The Harmatta patent and a pending United States application by Ferranti filed December 29, 1911, were, wrongfully as we contend, thrown into an interference with one another in the Patent Office because Ferranti in that application has inserted the first four claims of the Harmatta patent in suit. This interference has been decided against Ferranti by all the Patent Office tribunals and by the Court of Appeals of the District of Columbia, 273 Fed. 357.

There can be no interference in fact and none should have been declared. It is only because of the fact that, as is often the case, certain words can more or less inadequately describe two utterly different things, that the Patent Office found a verbal resemblance between Ferranti's butt welding idea and the spot welding of Harmatta.

In this interference Ferranti claimed the right to date his invention from the date of the provisional specification of his British patent.

This claim was made under the provisions of the second paragraph of Section 4887 of the Revised Statutes.*

Inasmuch, however, as Ferranti's United States application in interference (Vol. II, p. 1321) with the Harmatta patent is an application for a patent on spot welding, and as his application for his British patent was an application for an invention relating to the welding of turbine blades to the turbine wheel or disc, and consisted in adjusting of the metal of the turbine disc at the place of welding so that equal heating of the turbine disc at that place and of the end of the blade would result, the applications were for different inventions and not for the same invention, and hence Ferranti's United States application in interference is not entitled to the date of his application for the British patent. Consequently, as Ferranti has no other date prior to the date of Harmatta's United States application, the claim that he is an inventor prior in date to Harmatta must fail.

"An application for patent for an invention or discovery or for a design filed in this country by any person who has previously regularly filed an application for a patent for the same invention, discovery, or design in a foreign country which, by treaty, convention, or law, affords similar privileges to citizens of the United States shall have the same force and effect as the same application would have if filed in this country on the date on which the application for patent for the same invention, discovery, or design was first filed in such foreign country, provided the application in this country is filed within twelve months in cases within the provisions of section forty-eight hundred and eighty-six of the Revised Statutes, and within four months in cases of designs, from the earliest date on which any such foreign application was filed."

A "patent for the same invention", the very phrase employed in Section 4887 before the amendment of 1897, has invariably been construed by the courts as a patent which by claim or otherwise sought to cover the invention *claimed* in the United States patent.

Leeds v. *Victor*, 213 U. S. 301.
Fireball v. *Commercial*, 239 U. S. 156;
Westinghouse v. *Stanley*, 138 Fed. 823.
Acme v. *Commercial*, 192 Fed. 321, 327, 328.

Moreover Ferranti is not the prior inventor of the subject-matter of the claims of the Harmatta patent in suit because his British provisional specification (Vol. III, p. 1479) does not describe anything like spot welding.

To adjust the metal of the disc to obtain equal heating Ferranti suggests the cutting of grooves or holes in the face of the turbine disc which would leave projections to be welded to the butt end of the turbine blade. These projections, rendered plastic by the heat developed by the welding current, would be squashed down by the welding pressure and the spreading metal would fill the spaces between the projections and form one continuous weld (Gravell, Vol. I, p. 353).

If the projections did not merge, the process would be simply that of the prior Kleinschmidt and Robinson patents above discussed, namely projection welding.

Ferranti's process therefore does not anticipate Harmatta's invention.

The Examiner of Interferences in the *Ferranti* v. *Harmatta* interference awarded priority to Harmatta on two grounds, *first* that Ferranti's British provisional specification did not disclose the subject-matter of the interference issues, the first four claims of the Harmatta patent, and *second* that Ferranti, because of his delay, was estopped from making the claims, citing *Wintroath* v. *Chapman*, 248 O. G. 1003, and other cases to the same effect.

The Board of Examiners-in-Chief affirmed this award, holding that Ferranti had disclosed the subject-matter of the claims, but was estopped from making them.

The Commissioner of Patents on appeal by Ferranti held that Ferranti's British provisional specification did not disclose the invention.

The Court of Appeals of the District of Columbia held that Ferranti because of his delay was estopped from making the claims 273 Fed. 357.

That interference is significant as showing that the defendant and its associates have been struggling vigorously for several years to take from Harmatta his first four claims and to obtain a patent containing those claims for themselves.

The Ferranti application in interference with the Harmatta patent has been assigned from Ferranti to Mr. Melville Church, defendant's attorney, and assigned by him to Mulligan, Trustee, who is the head of the Welding Patents' Investigating Committee, an association formed to oppose the Harmatta patent. It is giving its assistance, other than financial, to the defense in this case.

The defendant, the Ford Motor Company, has taken a license from Mr. Mulligan under this Ferranti application (Vol. III, p. 1980).

The efforts that the defendant's associates are making to obtain for themselves the first four claims of the Harmatta patent are very significant as showing their belief that the subject-matter of those four claims is a patentable invention.

RIETZEL PATENT No. 928,701, JULY 20, 1909 (Vol. II, p. 1098) AND RIETZEL'S EARLY ABANDONED EXPERIMENTS.

The Rietzel patent No. 928,701, issued July 20, 1909, on an application filed February 24, 1905, and the abandoned experimental work done by Rietzel many years before, namely in 1898, are absolutely immaterial and have no bearing whatever upon the validity or scope of the Harmatta patent in suit.

The Rietzel patent both as to its date of issue, July 20, 1909, and its date of application, February 24, 1905, is later than the date, December 3, 1903, when Harmatta filed his application for the patent in suit in the United States Patent Office. It is therefore not part of the art prior to Harmatta and has no effect either anticipatory or

limiting upon Harmatta's patent. It can play no part in this case except to accentuate the fact that Rietzel's work was not on Harmatta's line, but only on that form of butt welding known as "projection welding".

The accompanying drawings illustrate a typical form of the Rietzel process of welding a projection on one sheet (the projection being formed by indenting the back of the sheet) to the face of another sheet. Figs. 2 to 5 of the patent show other forms of projections.

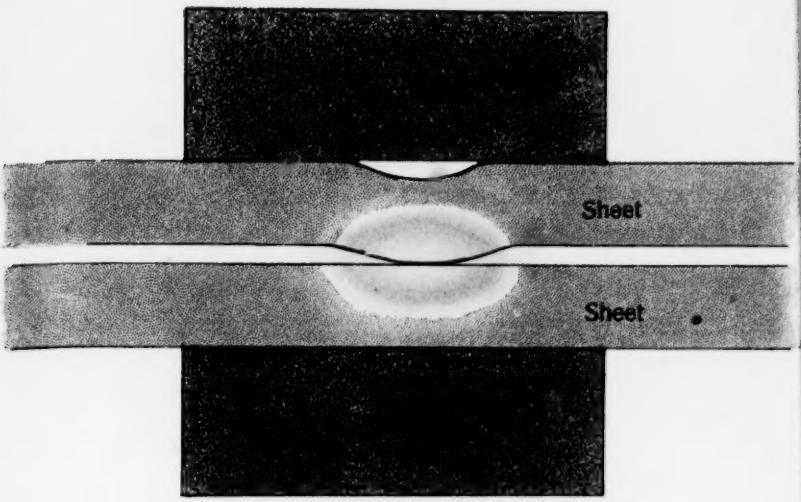
Mr. Rietzel, called by the defendant (Vol. I, p. 633), has fully set forth the nature of certain slight experimental work done by him in *1898*. He states that at that time he was the superintendent of the factory of the Thomson Electric Welding Company and one of the things which he wanted to weld was the ends of wheel or brake bands. The difficulty was that when the ends were butt-welded there was considerable extrusion of metal, or "burr" as it is called, which it was necessary to remove at considerable expense (Vol. I, p. 655). He thought that if the ends were overlapped they could be welded together. He first tried to do this with electrodes extending across the entire width of the ends of the bands, but this operation was not successful as it required too much current. He then took an electrode that had been used for welding studs on another machine and made four or five welds at the edges of the overlapped ends of the wheel band. Rietzel had no idea of making a weld at any point between the meeting faces of two plane sheets of metal in extended contact. He was trying to weld the overlapping edges only of two metal pieces.

Rietzel made a sketch (Vol. III, p. 2041) of what he did. From this sketch it will be seen that he did not at all have in mind Harmatta's process because the overlap of the ends of the bands was less than the width of the electrodes (just as in the Thomson roller process which we have fully dis-

REITZEL No. 928,701.

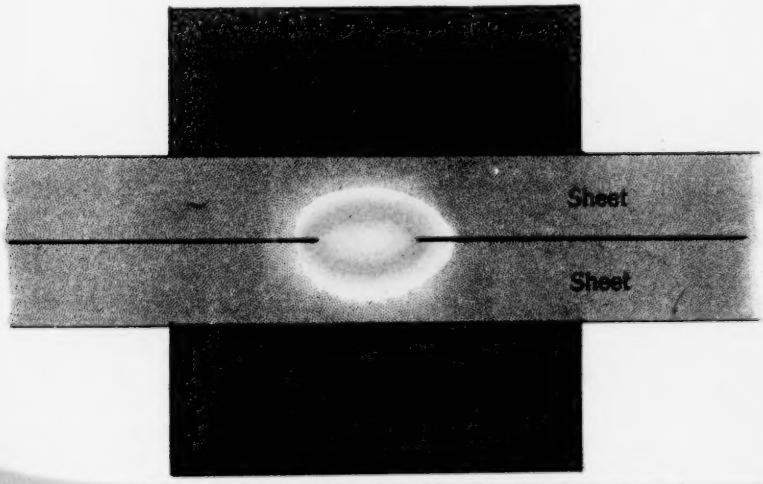
PROJECTION WELDING.

HEATING.



The above illustrate the process of Fig. 1 of the Rietzel patent. Fig. 2 shows like projections on both sheets in contact with one another. Fig. 3 shows projections cast on one of the sheets. Fig. 4 shows projections cast on both sheets and Fig. 5 shows small pieces of metal interposed between the sheets. All are variants of butt welding.

PRESSING.



cussed), so that the current and pressure were both localized by the arrangement of the work, not solely by the electrodes as in the Harmatta process. There was no creating of welding temperature at a spot in the meeting faces of plane sheets, which spot was entirely surrounded by metal, and no application of pressure to that spot through yielding metal entirely surrounded by a sheath of cold unyielding metal as in the Harmatta process. Rietzel's pressure squashed down the edges of his bands and the squashed metal spread out at the sides. In fact, it was his object to bring the ends of the two bands into one plane (Vol. I, p. 658, X-Q. 158).

Rietzel's welding failed to accomplish his purpose because it did not bring the ends of the bands fully into the same plane which was what he has trying to do. After trying this experiment a few times in July, 1898, he threw the pieces into the scrap heap (X-Q. 159) and abandoned the whole proposition. The only persons who, he thinks, saw this experiment were Mr. Robert W. Clark and Mr. George Osgood, both employees of the Thomson Electric Welding Company (Q. 19). He never communicated his work to the officials of that company (X-Q. 153). Mr. Clark remembers nothing whatever about it. Mr. Osgood has had a stroke of apoplexy and is unable to testify (Clark, Vol. I, p. 254).

This work was merely an experiment and immediately abandoned as it failed to accomplish the purpose desired.

Later in the same year 1898, Mr. Rietzel tried without success to weld together two pieces of a ploughshare by the same method (X-Q. 160). At about the same time he says that he welded two pieces of a ploughshare by punching up projections on one piece and welding them to the other piece. He only made one sample of this work. His statement that later two other samples were made in his absence from the plant is merely hearsay. Mr. Clark,

who, Mr. Rietzel said, did that work, does not recall anything about it (Vol. I, p. 254). This work was also purely experimental and nothing more was done along these lines for several years.

It is not conceivable that if Rietzel had accomplished anything substantial he would not then have developed it further. But *six years elapsed* before Reitzel again did any work involving the welding together of sheet metal pieces at isolated spots. Then in June, 1904, he welded together two sheaves forming a pulley by means of the projection welding method disclosed in his patent No. 928,701 (X-Q. 162), which is not Harmatta's process. As this date is subsequent to Harmatta's date of application this welding is not part of the art prior to Harmatta.

Under these circumstances Rietzel's experiments of 1898 made privately for his own instruction and edification, and not disclosed to any of the officials of the Thomson Company (Rietzel, Vol. I, p. 657, X-Q. 151), which were in no sense commercial, and not further developed or made the basis of any further development along the same lines, and the results of which went into the scrap heap, were merely abandoned experiments and have no effect to anticipate or limit the invention of the Harmatta patent in suit.

The law on this point is thoroughly settled. We cite the authorities, *infra*, p. 208, in connection with our discussion of the alleged McBerty prior use defense.

Defendant contends that in some way, not intelligibly defined, the plaintiff is estopped to deny that Rietzel anticipated Harmatta.

We show later (p. 220) that there is no basis whatever for this contention.

SUMMARY OF THE PRIOR ART.

In the prior art there is no patent which describes or foreshadows the Harmatta process of laying two plane sheets of metal one upon the other and uniting them by a weld at any point in their contacting surfaces however remote from their edges, the weld answering perfectly the purposes of a rivet (Gravell, Vol. I, p. 186, Dyer, Vol. I, p. 592, X-Q. 110).

Only the following patents of the prior art describe the overlapping of two plane sheets: Benardos United States patent 363,320, the Benardos German patent 50,909, Thomson soldering patent 496,019, Thomson riveting patent 396,015, none of which describe electric welding, and Thomson roller patent 444,928 and Lemp patent 553,923.

Of these patents the United States Benardos patent is for arc welding (*supra*, p. 23), the German Benardos patent is for welding or soldering by heating the backs of the sheets by hot blocks, with the same effect as if the heat were applied by a plumber's torch (*supra*, p. 24). The Thomson patent 496,019 is for soldering (*supra*, p. 27), and the Thomson patent 396,015 is for riveting (*supra*, p. 35). In the Thomson patent 444,928 the sheets are overlapped at their edges only, and a lapjoint weld is made by roller electrodes (*supra*, p. 50). In the Lemp patent 553,923 the same weld is made as in the Thomson patent 444,928 and several pairs of electrodes are employed to preheat the work (*supra*, p. 46).

None of the processes of these prior patents were put into use before the date, December 3, 1903, of Harmatta's application for the patent in suit.

None of these patents contain or suggest Harmatta's idea of making a spot weld between two plane sheets of metal.

The other patents of the prior art do not even deal with plane sheets.

The Coffin patent (*supra*, p. 26) and the Thomson patents 347,140 and 347,141 (*supra*, p. 6) describe the butt-welding of the ends of two rods.

The Blanchard patent describes merely the heating of a rivet (*supra*, p. 31).

The Lemp patent 531,197 describes the heating and annealing of a portion of a single hardened steel plate (*supra*, p. 32).

The Burton patent describes merely the heating of the ends of pieces of metal by the electric current, which ends are later welded on the blacksmith's anvil (*supra*, p. 32).

The Robinson patent (*supra*, p. 57) and Kleinschmidt patent (*supra*, p. 58) describe processes for welding projections on heavy plates to other plates, the projection in all cases extending to the edge of the plates. These processes are merely variations of butt welding.

The same is true of the Ferranti provisional specification accompanying his application for his British patent, so that that specification is immaterial even if considered a part of the prior art (*supra*, p. 64).

The Perry patent describes the process for welding cross-wires or superimposed balls and does not deal with sheets. It is butt welding (*supra*, p. 60).

The Parkinson British patent describes the process of squashing and welding a glut piece into a recess between two adjacent spokes of a wheel (*supra*, p. 61).

Harmatta's invention involved the idea of a new result, namely, a weld, perfectly answering the purposes of a rivet, made at any point between the contacting surfaces of two plane sheets of metal however remote from their edges. No prior patent describes or in any way foreshadows a process producing that result. (See Gravell's Chart, Vol. I, p. 427.)

No prior process made between two plane sheets of metal a

weld entirely surrounded by and integral with the metal of the sheets.

No prior process consisted in the following steps (*a*), laying two plane sheets one on the other in unlimited and unpredetermined extent of facial contact, (*b*), concentrating or localizing the welding current in a narrow path in the continuous metal of such sheets to heat only the metal in that path to a soft and plastic condition, leaving the surrounding metal cold and unyielding, and (*c*), applying welding pressure only to that soft and plastic metal to make the weld without moving the sheets bodily and without the extrusion of metal. That process was absolutely new with Harmatta. In that process three steps were absolutely new with him, namely, that of superimposing one sheet on another in indiscriminate unlimited unpredetermined facial contact, that of concentrating or localizing the welding current at a particular spot in the contacting surfaces of two such superimposed plane sheets, and that of localizing the pressure so as to press and move only softened metal surrounded by and integral with unyielding immovable metal.

The Harmatta process is an "*electric welding*" process, that broad art having been created by the original Thomson patents of 1886, wherein the heat is created by the resistance of the work itself. It is a branch of that art which was absolutely new with Harmatta.

Both the Harmatta process and the Harmatta product were radically new.

OPINION OF THE COURT OF APPEALS FOR THE SIXTH CIRCUIT (Vol. III, p. 2098).

The majority opinion of the Court of Appeals for the Sixth Circuit, delivered by Judge Knappen, Judge Denison dissenting, after a review of some of the patents of the prior art, to which we have above referred, sums up

its conclusion denying patentable quality to Harmatta's invention as follows:—

> "We agree with Judge Dodge* that Harmatta's idea of 'making his electric welds small in area rather than large in comparison with the areas of the opposed surface to be joined and isolating them, so as to leave each surrounded by a comparatively large area of unwelded surface', does not involve invention in view of the prior art. In other words, given the desire for a welding in spots, naturally enough suggested by the prior art and by its commercial development, we think Harmatta's specific application of the principles of that prior art involved only the skill of the expert mechanic. Not only every principle, but every electric and mechanical process, involved in the Harmatta claims, was well known in the prior or directly analogous arts, or in mechanical arts generally. We can not think, in view of the prior art, that invention is to be found in the considerations, separately or collectively, that in Harmatta no bodily movement of the sheets is required, that the current is localized and pressure exerted solely by the electrodes, or by the difference in the form of the electrodes, or by the difference in amount of extruded metal, as compared with some of the earlier applications of resistance welding. Although invention is not necessarily negatived by the fact that each element of the combination is old, the question of fact whether the combination itself involves invention in view of the prior art is always present."

The extract from the opinon of Judge Dodge above

*Judge Dodge in the Barney & Berry case in the Massachusetts District Court held the Harmatta patent invalid for lack of patentable invention. 227 Fed. 428, 433.

quoted would make it appear as if Harmatta's idea or inventive thought was merely to change the size of the welds between two opposed surfaces and to isolate those welds, but, we respectfully submit, Harmatta's invention involved much more than this.

What we believe to be the error of the majority of the Court of Appeals is made clear by a further examination of its opinion.

That opinion in the above quoted extract proceeds to explain the reasons why the court thought that no patentable invention was made by Harmatta "in view of the prior art", stating as the basis of its argument that "given the desire for a welding in spots, naturally enough suggested by the prior art and by its commercial development", no invention was required to do what Harmatta did. *If by this the Court meant that before Harmatta the patented art had disclosed or suggested the idea of a weld between the opposing surfaces of two plane sheets of metal at any place in their meeting surfaces however remote from their edges or that such a weld was known in the prior commercial art, we respectfully submit that the Court erred.*

The "desire" for a weld that would perfectly answer the purpose of a rivet (which was generally used), was undoubtedly present and pressing for the many years during which articles have been made from relatively thin metal sheets securely united to each other by rivets.

It is well said that "necessity is the mother of invention" and unsatisfied "desire" to accomplish a certain result is the best known proof of patentable quality in that development of the art which secures that result.

Inventors previous to Harmatta had suggested electric welding in place of ordinary or blacksmith welding for use in many special situations. But to unite two plane sheets *at any point in their meeting faces* required a departure from

known methods beyond "the skill of the expert mechanic" to which the Court of Appeals above refers.

Blacksmith welding of spots in the meeting faces of plane sheets was impracticable, if not impossible, because of the difficulties of heating and pressing the spot as we have explained (*supra*, p. 42). The "desire" for a spot weld had never been satisfied or capable of satisfaction by the blacksmith welding art. The electrical welding art, which for some work, had before Harmatta, taken the place of the methods of the blacksmith, suggested no method of solving the problem of heating and pressing at such a spot, which had so completely baffled the blacksmith.

The technical difficulties involved in creating the heat in the spot to be welded and in completing the weld remained unsolved until Harmatta. No one knew how to develop the heat at the place or spot to be welded when the sheets were in extended undetermined facial contact. No one knew how to apply the pressure necessary for welding without moving the sheets bodily towards one another. No one knew how to dispose of the extruded metal which was the characteristic of all welding before Harmatta.

The Court of Appeals seems to have altogether overlooked these considerations which in so many cases have been held by the courts to be in and of themselves quite sufficient to show patentable quality in an invention (*infra*, p. 98).

The best proof that there was invention in making a spot weld as described in the Harmatta patent is that the "desire", although existing and pressing for such a weld, did not lead even to a "suggestion" either of such a weld or of a method which would produce such a weld. The reason for such lack of suggestion may well have been that, as Harmatta has now shown, such a weld involved

a radical departure from previous theories of welding both blacksmith and electrical. But whatever the reason the lack of such suggestion stands out clearly from a review of the prior art and is of the utmost significance as showing the necessity of "invention" before the Harmatta result could be attained.

The patents referred to in the opinion of the Court of Appeals certainly do not disclose or suggest Harmatta's ideas.

The Thomson basic patents No. 347,140 and 347,141 disclose and suggest only electric butt welding the ends of rods (*supra*, p. 6).

The Thomson patent No. 396,015 for electric riveting is for almost the exact opposite of the idea, result and mode of operation of Harmatta's invention because it necessarily involves the use of a rivet while Harmatta's invention had as its basic thought the idea of a weld to take the place of a rivet and thereby dispense with a rivet. So far as any welding together of the plates around the rivet is concerned the Thomson patent does not describe a process of electric or resistance welding at all because the heat in the plates is *conducted thereinto from the rivet* and there is no suggestion in the patent of obtaining heat by the resistance method. Even if there were such a suggestion it would be immaterial because there is no idea of a Harmatta spot weld and no method disclosed by which one could be made (*supra*, p. 35).

The Thomson patent No. 444,928 for the roller lap welding process (*supra*, p. 40) contains no idea of a spot weld made anywhere between the meeting surfaces of two plane sheets placed on one another in any way. The Thomson process is capable of welding only the limited overlap of the edges of two sheets. Such lap welding was old before Thomson and he adopted an electric roller welding process to get that old result. Such a weld is

not a spot weld in any sense. Before Harmatta such a weld had never been made by anyone by any process of welding.

The opinion of the Court quotes from the Thomson roller patent "the work being properly arranged, so that the pressure devices will press the surfaces to be welded together and simultaneously passing the electric current through the work *at the point of pressure*" (Italics in opinion of Court), as if this was an anticipation or suggestion of Harmatta's invention. The language quoted from the Thomson patent is descriptive of every kind of electric welding known since Thomson's basic patents of 1886 in which this language might well have been employed. In all electric welding the pressure and the current are applied at the same point. Harmatta, like every other electric welder, did this precise thing, but he did it in a way which was entirely different from the way that anybody else had done it before and under new conditions to obtain a new result, which conditions and result were the creations of his own imagination, namely the placing of two plane sheets one on the other in unlimited, unpredetermined facial contact and the making of a spot weld at any point in their meeting faces. The Thomson roller patent nowhere suggests the idea of such indiscriminate placing of the sheets or of any method of welding, *i. e.*, heating and pressing, that could be used with sheets so placed. Thomson could weld only at the overlap of the sheets, with resulting modes of operation which were discarded by Harmatta, who employed radically new and different modes of operation.

The Thomson soldering patent No. 496,019, as we have above explained (*supra*, p. 27), is devoid of any suggestion of Harmatta's inventive thoughts. That patent discloses the idea of heating the contacting pieces, preferably with the aid of heat developed in the electrodes themselves, to

melt the solder over an indiscriminately large area between the pieces. In some examples it describes the use of roller electrodes with corrugated or grooved peripheries, the specification stating as quoted by the Court of Appeals:

> "the rollers exert pressure while the current heats the thin metal pieces at successive points between the rollers".

But there is no justification for the Court's inference herefrom that "this was, to say the least, electric resistance spot soldering".

If the Court means by this that there was "spot soldering", namely isolated spots of solder between the sheets opposite the projections on the rollers, we respectfully submit that there is not only no description or suggestion of this in the Thomson patent, but that such a result would be an impossibility. The Thomson patent points out (p. 2, lines 35-61) that the object of corrugating the electrodes is to increase their resistance where they contact with the work and thereby increase the heat generated in the electrodes themselves at those contact points, which heat is imparted by *conduction* to the sheets. Necessarily the heat of the sheets melts the solder at all points between the sheets reached by the heat of the sheets and there would therefor be a large area, not a series of spots of melted solder. Certainly the area of melted solder would extend throughout the length and breadth of the overlap of the sheets. No "spot soldering" or soldering in spots could possibly result. None is described in the patent.

The very fact that Thomson sought to unite metal pieces by soldering by means of heat created by the resistance to the passage of an electric current, which as compared to welding is a most ineffective weak way of joining two metal pieces together, shows that that inventor, one of the greatest in the history of electrical science, had

no conception that his idea of soldering involved or would suggest to anyone the idea of spot welding which would result in a really effective autogenous union at any point between the meeting faces of two plane sheets. Thomson, great inventor as he was, never took the mental leap from electric soldering to spot welding between plane sheets.

The idea of making a spot weld by the Harmatta process is simply not be to found in this Thomson soldering patent.

The Robinson patent No. 574,942 and the Kleinschmidt patent No. 616,436, also demonstrate that no one at their respective dates of invention, 1894 and 1898, had thought it possible or conceived the idea of uniting two *plane* sheets together by a spot weld. Both Robinson and Kleinschmidt prepared their work by making projections on the surfaces of the plates or bars involved and they merely welded the ends of those projections to the other pieces. This is a species of butt welding. Why should anyone go to the trouble and expense of creating projections, if it was obvious that two plane sheets might and could be welded together at any point in their meeting surfaces? The fact is that no one before Harmatta thought of doing that or thought of any way by which that could be done.

The only "commercial development" of electric welding in any form that appears by this record to have taken place prior to Harmatta's date of invention, which is that of the filing of his application, December 3, 1903, was that of butt welding the ends of rods, etc., according to the Thomson basic patents and a limited use of the Kleinschmidt process which was another species of butt welding. Neither of these commercial practices suggested the idea of a spot weld uniting two plane sheets of metal or suggested any method by which such a weld could be made.

The record fails to show any commercial use, prior to Harmatta, of Thomson's "electric riveting" or of his "electric soldering" or of his roller "lap-welding" or of Robinson's form of "projection welding".

The majority of the Court of Appeals for the Sixth Circuit therefore erred in assuming as a "given" premise for their conclusion that Harmatta's invention was not patentable, that "the desire for a welding in spots" was "naturally enough suggested by the prior art and by its commercial development".

The majority opinion of the Court of Appeals continues and says that—

> "not only every principle but every electric and mechanical process involved in the Harmatta claims was well known in the prior or directly analogous arts or mechanical arts generally".

We respectfully submit that the Court erred in this statement. Where can one find in the prior art the "principle" involved in spot welding? Where is there suggested the possibility of welding together at a spot two plane sheets placed indiscriminately on top of one another? Every prior inventor in the welding art was obliged to prearrange or preshape his pieces to be welded as a necessary preliminary to making the weld and he did so because he had no idea of how otherwise to provide the necessary resistance to the passage of the current and because he had no other idea than that of uniting them over their entire area of contact which was butt welding. Harmatta's "principle" of dispensing with any prearrangement or preshaping of the work was absolutely new in the welding art, electric or otherwise.

His "principle" of imposing the function of concentrating or localizing the current in a spot between two such indiscriminately superimposed sheets solely on the tapered

electrodes was also absolutely new. No one before Harmatta had confined an electric current to the place to be welded, whatever its extent, solely by the shape and relative position of the electrodes themselves. Every prior inventor in that art had proceeded upon the opposite principle of prearranging or shaping the pieces to be welded whereby their parts in contact provided a path of comparatively small cross-sectional area which increased the resistance of those parts so as to generate the heat necessary for welding.

Where in any patent of the prior art is Harmatta's "principle" of applying pressure to be found? Every inventor in the prior art had welded two articles together by pressing them bodily towards one another. Harmatta dealt with a condition of sheets in extended facial contact in which such mutual bodily movement was impossible and no one before him had disclosed or suggested how to deal with such a condition. Harmatta dealt with it by applying pressure solely to the softened metal lying in the path between the two electrodes and utilized the cold unyielding surrounding metal to confine that spot of softened metal so that a very slight movement of the electrodes made the weld. That was an absolutely new "principle" of operation in electric welding. No such principle was of course involved in electric soldering because in that process no welding pressure is employed or is needed, the parts being simply held in position after the current is turned off and the solder cools.

We therefore respectfully submit that every "principle" of the Harmatta process, apart from the basic "principle" of electric welding common to all processes of that art, was new with him and involved patentable quality.

The majority opinion of the Court of Appeals for the Sixth Circuit then states that they find no invention

"separately or collectively" in certain recited characteristics of the Harmatta process.

A mere listing of those characteristics without an appreciation of their relation to Harmatta's new idea and to the problem involved of making a spot weld does not show their true significance. Harmatta after having had the new and radical thought of making a weld at any place in the meeting faces of two plane sheets of metal was confronted with the problem of how to do it. He solved that problem by the invention of new "principles" of operation. Those new "principles" involved radical departures from all previously known methods of operation and give additional and complete patentable quality to Harmatta's basic brilliant thought of making a spot weld by giving to the world a simple commercial new process for obtaining a new result, namely the new product, spot welded articles produced by that process.

Harmatta's invention is a striking example of the truth of the statement of this Court in the case of *Smith* v. *Nichols*, 21 Wall. 112, in which Justice Swayne said (p. 118):—

> "A patentable invention is a mental result. It must be new and shown to be of practical utility. Everything within the domain of the conception belongs to him who conceived it. The machine, process, or product is but its material reflex and embodiment. A new idea may be ingrafted upon an old invention, be distinct from the conception which preceded it, and be an improvement. In such case it is patentable. The prior patentee cannot use it without the consent of the improver, and the latter cannot use the original invention without the consent of the former."

THE HISTORY OF THE COMMERCIAL ART SHOWS INVENTION BY HARMATTA.

The Thomson patents of 1886 protected the business of the Thomson Company, for they covered broadly the process and product of electric welding, as Thomson's invention was a true pioneer invention, having created the art of electric welding. The Thomson patents were sustained in the suit of the *Thomson Electric Welding Company* v. *Two Rivers Manufacturing Company*, 63 Fed. 120, on a motion for preliminary injunction.

But the underlying Thomson patents disclose, as his only specific application of his fundamental invention, one which was of limited utility, namely, the electric welding of the butt ends of two rods. Naturally the Thomson Company was eager to extend its business of electric welding to other fields in which Prof. Thomson's generic idea could be made useful. But until Harmatta's invention, by which for the first time in the art it was practical and feasible by the use of new principles of operation to unite two thin plane sheets of metal together by electric welding *at any spot* or at several spots of their contacting surfaces, no practical application of Thomson's invention of electric welding was made beyond that of the butt welding originally disclosed by him in his patents of 1886 and some variants of that butt welding.

Numerous inventors, including Prof. Thomson himself, between 1886 and December, 1903 (the date of Harmatta's application), endeavored to promote the art of electric welding by the invention of a number of methods all based upon Prof. Thomson's butt welding idea and involving characteristics similar to those of butt welding.

The later patents of the electric welding art, which were prior to Harmatta, were attempts to meet the exigencies of welding together pieces of metal of a variety

of shapes and forms by close adherence to the specific butt welding ideas disclosed by Prof. Thomson in his patents of 1886. Except to a moderate extent in the case of the Kleinschmidt patent they were all unsuccessful and made no impression on the art.

Not one of these inventors from 1886 to 1903 suggested the idea of a spot weld or even attempted to deal with *the problem first successfully solved by Harmatta of uniting by welding two plane sheets of thin metal at any spot in their contacting surfaces.*

Each of these prior patents for electric welding was dealing with articles shaped or arranged in some particular way, *i. e.*, ends of butted rods, projections formed on plates or bars, or overlapped edges of sheets. By such shape or arrangement the current was forced through a narrow path in the work itself. There was no comparatively cold surrounding metal to be dealt with, and the movement of the contacting metals bodily towards and into one another in the process of welding was required and permitted, with the consequent extrusion of metal laterally from the welded joint. Each patentee, including Thomson in his original patents, worked on this same principle of obtaining the necessary resistance at the weld by restricting the cross-sectional area of the metal path through which the current passed, modifying that principle only by applying it to articles shaped or arranged in different ways. Harmatta discarded that principle and invented and discovered the new principle of concentrating the electric current in a path in the body of two sheets in extended facial contact by imposing that function of concentrating the current solely on the electrodes.

So far as this record shows, none of the prior electric welding processes, developed since the Thomson butt welding of 1886, ever made any impression upon the commercial arts, except to some extent that of Klein-

schmidt, which was confined to welding projections on splice bars to rail webs, a species of butt welding operation. As a practical matter, the art of electric welding was no more advanced in 1903 than it was at its inception by Thomson in 1886. No new developments had been made and none had gone into commercial use (except that of Kleinschmidt to a limited extent), although everyone engaged in the business of electric welding and skilled in that art, and particularly the Thomson Electric Welding Company, was anxious to extend electric welding to other fields besides that of butt welding. There awaited the inventor of a new application of Thomson's generic process a large reward for such an invention. Yet nobody worked out any practical way of utilizing Thomson's generic process, except by variations of Thomson's specific method of butt welding, all having the characteristics above stated of that process, until Harmatta made the inventon of the patent in suit, which, while an electric welding process, was in all other respects the antithesis of the prior applications of electric welding and operated on new principles.

PROFESSOR WAGNER'S COMPARISON OF HARMATTA'S INVENTION WITH THE PRIOR ART.

The Court will apprehend the radical novelty of Harmatta's invention from the fact that while other inventors in the electric welding art, following Thomson's creation of that art in 1886, merely adapted electric welding to the making of the same kind of welds that had been made before by other welding processes, Harmatta accomplished a new result, namely a spot weld, perfectly answering the purposes of a rivet, made at any point between the contacting faces of two plane sheets of metal where a rivet had formerly been employed, without the necessity of any prearrangement or modification of those sheets, which

weld had never before been made by any process of welding.

Professor Wagner, an eminent physicist and electrical engineer, professor of mechanical and electrical engineering at Rose Polytechnic Institute, Terre Haute, Indiana, has carefully considered the prior art (Vol. I, p. 331, p. 340). He states his conclusions as follows (p. 340):—

> "We come now to a consideration of the Harmatta patent in suit, No. 1,046,066, dated December 3, 1912. *Harmatta undertakes to solve a problem different from those dealt with by prior inventors*, but falling also under the general line of development from the original Thomson electric welding patent. In most of the prior patents which I have considered, inventors were trying to accomplish by electric welding something which had previously been done by a blacksmith using ordinary heating methods. The original Thomson patent proposed to make butt welds of rods and bars, a thing which a blacksmith commonly did. The Thomson roller welding patent also attempted to do by electrical methods what was formerly done in metal working, namely, to make lap weld seams. Kleinschmidt performed a butt welding operation which might have been done in a well equipped forge shop, but which was novel because of necessity the work was required to be done away from a forge shop and required portable apparatus.
>
> "Harmatta, however, attacks a problem which had never been solved by blacksmithing methods. His problem was to fasten together by electric welding flat sheets of metal placed one on top of the other. In the sheet metal art, this had been done previously by the use of rivets. Harmatta replaced rivets by electrically welding the plates at the spots where riveting would ordinarily be used. The method

employed by Harmatta was to place electrodes opposite each other with the plates to be joined lying between the electrodes; one of the electrodes was stationary, the other electrode could be moved toward the stationary electrode and forced toward it with considerable pressure. A suitable electric current was passed through from one electrode to the other and a pressure exerted upon the movable electrode. It was found that the current thus passed through the two plates pressed together would raise the metal to a welding temperature and the pressure would produce a weld.

"In the development of the art of electric welding prior to Harmatta the area of the surfaces in contact between the two pieces to be welded was always limited in extent. In the original Thomson patent the area of the ends of the rods being joined was the contact surface, and determined largely the amount of heat developed. In the Thomson and Lemp roller patents the amount of overlap of the plates restricted the area of contact surface. In the Robinson, Kleinschmidt and de Ferranti patents the size of the projections determined the contact surface, and in all these cases the completed weld was of substantially the same area as the contacting surface.

"*There was, therefore, nothing in the prior art to show Harmatta that when two sheets were placed one upon the other, contacting over a large area, these sheets could be welded together in an isolated spot.* I do not believe that anyone skilled in the art at the time of Harmatta's invention could have stated with any degree of assurance in advance of actual trial that Harmatta's device would produce a real serviceable weld." . . .

"For the reasons given above, it is my opinion that the flow of electricity and of heat in the practice of the

Harmatta process of spot welding is so complex that the teachings of the prior art would not suggest the Harmatta invention, and that with the knowledge and skill available at the date of the Harmatta invention it would not be possible to state whether or not the Harmatta process would be successful in producing commercially valuable welds. As a matter of fact, the Harmatta process of spot welding has proven of immense commercial value, and the fact that the operation seems so simple after it has once been accomplished should add to rather than detract from the merit of the invention. It is the more remarkable in that the fundamental Thomson electric welding patent antedates the Harmatta invention by some seventeen years; and that, while the art was developed in a number of other directions, the development of spot welding waited so long. The reason for this seems to me to be that in the other lines of development of electric welding the attempt was made to accomplish by electric welding what had previously been done by other metallurgical or blacksmithing operations. *Harmatta struck out in a new field and accomplished something which had never before been accomplished by any method, namely, the welding together at isolated spots, and without previous preparation, parallel, superimposed metal sheets.*"

HARMATTA'S PROCESS INTRODUCED INTO THE UNITED STATES IN 1904.

The spot welding process of the Harmatta patent was first introduced into the United States in 1904 directly from Harmatta by the purchase of a license for kitchen ware and like articles by the National Enameling & Stamping Company from the Eisenhutte Silesia Company of Hungary, the owner of Harmatta's rights. The license dated December 3, 1904, is in evidence (Vol. I, p. 433). With the license the National Company purchased two Harmatta spot welding machines which are now in its factory and have been in constant use up to the present time. Since then the National Company has built and used between eighty and one hundred spot welding machines. These facts are established by the testimony of Mr. Knapp, the general director of the National Company (Vol. I, p. 125). Undoubtedly this extensive use of the Harmatta process and the sale of its products by the National Company beginning in 1904 spread the knowledge of Harmatta spot welding throughout the United States.

INFRINGEMENT.

Infringement by the defendant is established by the plaintiff's interrogatories and the defendant's answers thereto (Vol. I, pp. 20-23) and is not denied. Those interrogatories and answers are stipulated to have the same force as a deposition (Vol. I, p. 24).

According to these interrogatories and answers, the defendant, the Ford Motor Company, has been practicing during the period between December 3, 1912, and the filing of the bill of complaint, at its factory in Detroit, the Harmatta spot welding process by means of a number of spot welding machines purchased from the Winfield

Electric Welding Machine Company prior to December 16, 1916.

These machines are correctly represented in the drawing (Vol. I, p. 22, and *supra*, p. 14).

In these machines the copper electrodes are tapered and are connected respectively to the terminals of a secondary circuit of an electric transformer. In operating these machines the operator places two or more superimposed thicknesses of metal constituting the work between the electrodes, presses the electrodes against the work and passed the electric current through the electrodes and through the work at the spot between the electrodes controlling the current by means of a switch. When the weld is completed the current is cut off and the electrodes separated from the work.

The defendant has practiced this process in its manufacture of mufflers, radiators, fenders, bodies and other parts of its automobiles (Vol. I, p. 23).

Plaintiff's Exhibit No. 2, a spot welded part of a muffler, is a fair example of the products produced by the defendant as a result of practicing the Harmatta process (Vol. I, pp. 20, 23).

The plaintiff's expert, Gravell, with reference to the defendant's process and product testified (Vol. I, p. 64):—

> "An example of the product of the process is shown in Exhibit No. 2 illustrating how the process is repeated a number of times on the same article to produce a number of welds.
>
> "The exhibit shows a number of isolated welds, which are technically known as 'spot welds'.
>
> "It is evident that the metal heated for welding has been confined by relatively cold metal and that no extruded metal has occurred. (In one case the metal from the weld has extruded, but this is a defective weld.)

"It is also clear from Exhibit No. 2 that the superimposed thicknesses of metal did not move in relation to each other during the process, for prior to the processing these parts were placed in close overlapping contact and could not possibly move. This is especially clear when we consider that after the first weld was made the two parts were locked together.

"The answers to the interrogatories considered in connection with Exhibits Nos. 1 and 2 clearly describe the same process as is described in Harmatta's specification.

"In both cases pointed electrodes concentrate the current and the pressure which are applied to the superimposed thicknesses of metal which constitute the work, the weld occurs in the work between the electrodes and is restricted to the spot where the current and pressure are concentrated. During the welding process the superimposed parts do not move in relation to each other, the metal heated for welding is confined by relatively cold metal and no extruded metal is produced.

"I know of my own knowledge that the answers to the interrogatories are correct and that the Harmatta process is used at the Detroit plant of the Ford Motor Co., for on January 9, 1918, I visited the Ford plant and saw machines arranged to carry out the Harmatta process shown in Exhibit No. 1, and I personally operated one of these machines and found that it produced a spot weld according to Harmatta's process. The specimen which I welded I here produce."

The defendant has, therefore, practiced the exact Harmatta process set forth in the patent in suit and made by that process the Harmatta product. It has therefore infringed all of the claims of the patent.

Neither in the District Court nor in the Court of Appeals, has the defendant denied infringement.

SUMMARY OF FACTS SO FAR DISCUSSED.

The plaintiff, the Thomson Spot Welder Company, is engaged in the business of manufacturing, selling and leasing electric welding machines by means of which the process described and claimed in the Harmatta patent is carried out and the welded articles to which some of the claims of the Harmatta patent are directed are produced.

The defendant has infringed and makes no attempt to deny its infringement.

The sole question, therefore, is whether the Harmatta patent is valid.

As to this question the record establishes certain fundamental facts:

That the invention, colloquially known as "spot welding", described in the Harmatta patent is based upon the idea of making, and results in *a weld* between two *plane* sheets of metal *indiscriminately superimposed* upon one another in unlimited unpredetermined extent of contact, which weld is made *at any spot* in their meeting surfaces and *which answers perfectly the purpose of a rivet.*

That before December 3, 1903, the date of filing of Harmatta's application, no patent or printed publication disclosed that idea or described a process which produced or purported to produce that result. *Spot welding was absolutely new with Harmatta.*

That Harmatta described and made practical *a new method of manipulating sheets to be welded*, namely the superimposing of two plane sheets *indiscriminately* one upon the other in unlimited unpredetermined extent of facial contact and without any reshaping of those sheets, as by the creation of projections thereon. It was absolutely new with Harmatta to get rid of the requirement, neces-

sarily present in all preceding methods of welding, of any special relative arrangement of the pieces to the welded or of preshaping those pieces.

That Harmatta described new instrumentalities to be used in electric welding, namely tapered electrodes to concentrate the current.

That Harmatta was the first inventor in the art to impose the function of concentrating or localizing the welding current solely on to the electrodes.

That Harmatta discovered a fact, never before known, namely that in two plane sheets in indiscriminate extended facial contact a welding current would be confined by tapered electrodes to the path in the sheets between the ends of those electrodes to heat the spot in that path between the faces of such metal sheets. No one knew that fact before Harmatta's discovery of it. It was not warranted by established electrical theory.

That Harmatta disclosed the fact, previously unknown, that by the use of such electrodes a weld could be made between two such sheets of metal, without moving them bodily towards one another, by pressing on heated metal only, which heated metal was surrounded by cold unyielding metal.

That Harmatta's invention was first introduced commercially into the United States in 1904 by the National Enameling and Stamping Co., as stated (*supra*, p. 92), and has been practiced continuously and successfully since then by Harmatta's licensees and assignees.

That the invention of spot welding described in the Harmatta patent has gone into the most successful commercial use in welding sheet metal articles of every conceivable kind. *Billions of spot welds* are made every year by plaintiff's licensees, and billions are made by infringers.

That Harmatta's invention of spot welding created a branch of the art of electric welding which is of greater commercial utility than that of all other kinds of electric

welding added together (Gravell, Vol. I, p. 63). It has taken a position in the metal working arts of unquestioned industrial pre-eminence.

Under these circumstances the defendant's main contention that Harmatta's invention is lacking in patentable quality must certainly fail.

PATENTABILITY OF THE IDEA OF ELECTRODE SPOT WELDING.

The invention in the Harmatta patent lies fundamentally in Harmatta's strikingly novel idea of the isolated electrode spot weld made from the metal of the plane, flat surfaces of two thin sheets of metal indiscriminately superimposed one on the other, at any spot between them, whereby the sheets are joined together more cheaply and more strongly than they could be joined by a rivet. This idea he carried out by solving a new problem and by devising new principles of operation and a process having new characteristics. He was not merely welding by electricity two things that had been welded before by other means, but he had the new idea of "welding together at isolated spots and without previous preparation, parallel superimposed metal sheets", which was "something which had never before been accomplished by any method" as above stated by Professor Wagner. So different was the problem that Harmatta solved from any that had been dealt with by any one before him that his invention involved principles of operation and characteristics which are exactly the opposites of those of the electric welding processes of the prior art except in so far as they all involve the basic principles of electric welding.

Such a spot weld made between such plane superimposed sheets of metal at any point in their meeting surfaces was an absolutely new result in the art. No one had ever made such a weld before.

Even if each of the steps involved had been old in the art, which is not the case, the fact that Harmatta's invention attained this new result is the best evidence of invention.

In *Loom Company* v. *Higgins*, 105 U. S. 580, this Court in sustaining a patent for a new arrangement of old elements in a loom which raised the output of the loom from 40 to 50 yards per day said (p. 591):—

> "It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result, never attained before, it is evidence of invention."

This language has been quoted with approval by this Court in *Carnegie Steel Company* v. *Cambria Iron Company*, 185 U. S. 403, 446.

In *Expanded Metal Company* v. *Bradford*, 214 U. S. 366, this Court in sustaining a patent for a new method of making reticulated metal said (p. 381):—

> "It is perfectly well settled that a new combination of elements, old in themselves, but which produce a new and useful result, entitles the inventor to the protection of a patent." Citing *Loom Company* v. *Higgins*, 105 U. S. 580, 591.

The steps of the process by which Harmatta achieved his new result, except insofar as they embodied old principles of electric welding, were absolutely new.

They were, *first* the indiscriminate placing of two flat sheets upon one another without regard to the extent of their facial contact. No one had ever done this before in any kind of welding, blacksmith or electric. The very lack of a predetermined relation between the sheets is a feature of Harmatta's process which gives it not only

novelty but widespread application to all kinds of articles made of sheet metal in which the sheets of necessity can not be placed in a predetermined limited relation as was required by all welding processes of the prior art.

Second, Harmatta's concentration of the welding current to a path in those sheets between the ends of two tapered electrodes was an absolutely new electrical feat involving a new discovery that the welding current would confine itself under those conditions to that path.

Third, the completion of the welding by the slight but firm movement of the electrodes themselves bearing upon softened metal on each side of the spot to be welded without moving the sheets bodily was an absolutely new step in the welding art. No one had ever done that before.

Harmatta's new result was therefore achieved by new series of steps, each one of which was in itself new.

There are many cases in which this court has sustained patents for processes in which there was far less novelty in the several steps constituting those processes.

AUTHORITIES ON PATENTABLE PROCESSES.

This Court has held consistently that a process is patentable when based upon a new idea in the treatment of materials.

In *Mowry* v. *Whitney*, 14 Wall. 620, this Court held valid and infringed a patent for a process of casting car wheels. According to the prior art, a car wheel was cast in a mould, around the periphery of which was a metal rim, whereby the tread of the wheel was chilled quickly, thereby making it hard, while the centre of the wheel cooled slowly, thereby making it tough, but the difficulty was that, due to the unequal rate of cooling, the metal drew away from the centre and often broke. Whitney's improvement consisted in the idea of inserting the car wheel, after the rims had been chilled but before the rest of the wheel had

chilled, into a furnace where the whole wheel was again heated, after which it was allowed to cool slowly.

The court said (p. 642):—

> "The novelty of the patentee's invention is not therefore disproved by evidence that glass, or speculum metal, or even other iron casings had been annealed and slow-cooled, prior to the time when it was made. Of this there is very considerable evidence both in the testimony of witnesses and printed publications. The specification disclaims invention of annealing iron castings done in the ordinary mode. It claims annealing when applied to cast-iron railroad wheels, in the mode or by the process described. It is not therefore merely an old contrivance or process applied to a new object, a case of double use. A new and previously unknown result is obtained, namely, the relief of the plate of the wheels from inherent strain without impairing the chilled tread, a result which, though anxiously sought, had not been obtained before Whitney's invention. We are therefore of opinion that the defence set up that the patent was void for want of novelty of invention is unsustained."

In *Lawther* v. *Hamilton*, 124 U. S. 1, this Court held valid and infringed a patent for the process of extracting oil from cotton seed, the novelty of which consisted in omitting the use of muller-stones which were used in previously employed processes for crushing the seed, and instead crushing the seeds between heavy rollers.

The court said (p. 11):—

> "We cannot but think that Lawther discovered a new process of manufacturing oil from seeds, and that he was entitled to a patent therefor; and we are of the opinion that the patent in suit, construed as we have suggested, is a good and valid patent."

In *Tilghman* v. *Proctor*, 102 U. S. 707, this Court held valid a patent for a process of making glycerine which consisted in manufacturing glycerine from fatty bodies by the action of water at high temperature and pressure.

In *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366, this Court held valid and infringed a patent for making expanded metal sometimes known as "reticulated" metal, which is a metal screen having diamond-shaped openings formed by cutting a metal sheet in slits and then pulling the cut metal so as to open the slits.

Previous to the invention of the patent in suit the metal after being cut had been merely bent, thereby producing irregularities and shortening the sheet crosswise. By the process of the patent in suit the metal sheet was simultaneously cut and stretched to form the diamond-shaped openings.

The court found patentable invention in the improvement, and said (p. 381): —

> "It is suggested that Golding's improvement, while a step forward, is nevertheless only such as a mechanic skilled in the art, with the previous inventions before him, would readily take; and that the invention is devoid of patentable novelty. It is often difficult to determine whether a given improvement is a mere mechanical advance, or the result of the exercise of the creative faculty amounting to a meritorious invention. The fact that the invention seems simple after it is made does not determine the question; if this were the rule many of the beneficial patents would be stricken down. It may be safely said that if those skilled in the mechanical arts are working in a given field and have failed after repeated efforts to discover a certain new and useful improvement, that he who first makes the discovery has done more than make the obvious improvement which would suggest

itself to a mechanic skilled in the art, and is entitled to protection as an inventor. There is nothing in the prior art that suggests the combined operation of the Golding patent in suit. It is perfectly well settled that a new combination of elements, old in themselves, but which produce a new and useful result, entitles the inventor to the protection of a patent. *Loom Company* v. *Higgins*, 105 U. S. 580-591.

"To our minds, Golding's method shows that degree of ingenuity and usefulness which raises it above an improvement obvious to a mechanic skilled in the art, and entitles it to the merit of invention. Others working in the same field had not developed it, and the prior art does not suggest the combination of operations which is the merit of Golding's invention."

In *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U.S. 403, this Court held valid and infringed the Jones patent for a method of mixing molten pig-metal, the gist of which consisted in providing a large reservoir into which the molten metal from different furnaces was delivered and from which the molten metal was drawn off to be treated in the converters, there always being enough molten metal in the reservoir to constitute a "dominant pool" so that the variations in the metal coming from the different furnaces were eliminated by the blending of all the metal in the reservoir. The novelty consisted in the idea of this dominant pool, which was never exhausted.

The court, referring to certain prior devices which might have been used to carry out the process of the patent, made the following statement, which is particularly pertinent to the defendant's argument on the prior art in this case (p. 421):—

"This defence presents the common instance of a patent which attracted no attention, and was com-

mercially a failure, being set up as an anticipation of a subsequent patent, which has proved a success, because there appears to be in the mechanism described a possibility of its having been, with some alterations, adaptable to the process thereafter discovered. As hereinafter observed, a process patent can only be anticipated by a similar process. It is not sufficient to show a piece of mechanism by which the process might have been performed."

And again on page 425 the court said:—

"If the mere fact that a prior device might be made effective for the carrying on of a particular process were sufficient to anticipate such process, the absurd result would follow that, if the process consisted merely of manipulation, it would be anticipated by the mere possession of a pair of hands."

On the question of invention as distinguished from mechanical skill the court said (p. 429):—

"It is true the Jones patent is a simple one, and in the light of present experience it seems strange that none of the expert steel makers, who approach so near the consummation of their desires, should have failed to take the final step which was needed to convert their experiments into an assured success. This however, is but the common history of important inventions, the simplicity of which seems to the ordinary observer to preclude the possibility of their involving an exercise of the inventive faculty."

The court concluded its opinion by quoting the law from *Loom Co.* v. *Higgins*, 105 U. S. 580, 591, as follows (p. 446):—

"We cannot better conclude this opinion than by

> the following extract from the opinion of Mr. Justice Bradley in *Loom Co.* v. *Higgins*, 105 U. S. 580, 591: 'But it is plain from the evidence, and from the very fact that it was not sooner adopted and used, that it did not, for years, occur in this light to even the most skillful persons. It may have been under their very eyes, they may almost be said to have stumbled over it; but they certainly failed to see it, to estimate its value, and to bring it into notice. . . . Now that it has succeeded, it may seem very plain to any one that he could have done it as well. This is often the case with inventions of the greatest merit. It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result, never attained before, it is evidence of invention'."

These cases are fair examples illustrating the rules of law applicable to patentable processes. In each of these cases there was a novel idea, corresponding to Harmatta's novel idea of electrode spot welding. The Harmatta conception of electrode spot welding involved patentable invention as truly as the idea of a dominant pool in steel making, the idea of simultaneously stretching as well as cutting the sheet of metal to form expended metal, the idea of reheating and slowly cooling the car wheels, the idea of eliminating the crushing of the cotton seeds by muller-stones, and the idea of using water at high heat and pressure to extract glycerine from fatty bodies.

In all these processes the invention is in the conception of the treatment to which the material acted upon is subjected and not in the mechanism by which the process is carried out. Just because this is true in the case of a process it is easy to say that this new idea, which seems so

simple now that it is known, did not involve invention, and that the devices of the prior art could be easily modified so as to carry out the process of the patent in suit.

But the answer is that no one before had the necessary and lacking idea, so that, although there existed the latent demand, it was not satisfied until the idea was conceived. This required invention.

In this case the process of electrode spot welding, of which Harmatta undisputably was the first inventor, dealt with and solved a new problem. It involved new principles of operation and new characteristics. It is not described or suggested in the prior art and it produced a new and valuable result, namely, thin sheets of metal united together at any spot on their meeting faces by an electric weld answering all the purposes of a rivet. No one had ever thought of doing this before by any process of welding, electrical or otherwise.

The process has gone into very wide commercial use and has enabled manufacturers of sheet metal articles to make these articles more cheaply and more strongly than they could by riveting them, and also to make a large number of articles which they could not make by riveting because the rivet heads would have marred the appearance of the article and because the union must be made at spots where the shape of the article prevents the use of a rivet.

CASES OF PATENTABLE ARTICLES ANALOGOUS TO THE HARMATTA PRODUCT.

The Harmatta process produced a product which had never before been attained in the art. It consists of two thin metal sheets or plates with their inner contacting or meeting faces welded, so as to form an intimate union, at distinct and separate or isolated points, such isolated welds, which are formed solely from the metal of the sheets or plates, securing them together and practically making them into one integral article.

This product has been embodied in all kinds of articles and proved its thorough usefulness in the commercial world as shown by the uncontradicted testimony of Mr. Cutter (Vol. I, pp. 133-137). Before Harmatta made his invention no such product existed, and no such product is suggested by the prior patents introduced in this case, as we have shown above. The article is a new combination of elements, namely, the two sheets and the isolated spot welds by which they are joined together. It is a new and useful combination which under the authorities is patentable. We cite a few analogous cases from the decisions of this Court:—

Barbed Wire Patent, 143 U. S. 275.

The patent was for a barbed wire fence consisting of two strands of wire twisted together, around one of which was coiled short pieces of wire or barbs held in place by the other strand. The prior art disclosed a barbed wire fence having two strands twisted together, on one of which was strung diamond-shaped prongs of flat metal.

Patentability turned on the question whether there was invention involved in simply using a coil of wire instead of a diamond-shaped piece of flat metal as the barb. The device of the patent had met with success.

The Supreme Court held (p. 282) as follows:—

> "Under such circumstances courts have not been reluctant to sustain a patent to the man who has taken the final step which has turned a failure into a success. In the law of patents it is the last step that wins. It may be strange that, considering the important results obtained by Kelley in his patent, it did not occur to him to substitute a coiled wire in place of the diamond shape prong, but evidently it did not; and to the man to whom it did ought not to be denied the quality of inventor."

Krementz v. *Cottle*, 148 U. S. 556.

The patent was for a collar button made of one piece of metal as compared with the prior art showing collar buttons made out of several pieces of metal soldered together.

The Supreme Court said (p. 559):—

> "It is not easy to draw the line that separates the ordinary skill of a mechanic, versed in his art, from the exercise of patentable invention, and the difficulty is specially great in the mechanic arts, where the successive steps in improvements are numerous, and where the changes and modifications are introduced by practical mechanics. In the present instance, however, we find a new and useful article, with obvious advantages over previous structures of the kind. A button formed from a single sheet of metal, free from sutures, of a convenient shape, and uniting strength and lightness, would seem to come fairly within the meaning of the patent laws."

Diamond Rubber Co. v. *Consolidated Rubber Tire Co. and Rubber Tire Wheel Co.*, 220 U. S. 428, 434.

In this case the patent covered the holding of a solid rubber tire in the U-shaped channel of a wheel by two circumferential wires instead of cementing it in place.

> "The tire has utility, a utility that has secured an almost universal acceptance and employment of it, as will subsequently appear. It was certainly not an exact repetition of the prior art. It attained an end not attained by anything in the prior art, and has been accepted as the termination of the struggle for a completely successful tire. It possesses such amount of change from the prior art as to have received the approval of the Patent Office, and is entitled to the

presumption of invention which attaches to a patent. Its simplicity should not bind us as to its character. Many things, and the patent law abounds in illustrations, seem obvious after they have been done, and, 'in the light of the accomplished result', it is often a matter of wonder how they so long 'eluded the search of the discoverer and set at defiance the speculations of inventive genius' (*Pearl* v. *Ocean Mills et al.*, 11 Off. Gaz. 2). Knowledge after the event is always easy, and problems once solved present no difficulties, indeed may be represented as never having had any, and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention. But the law has other tests of the invention than subtle conjectures of what might have been seen and yet was not. It regards a change as evidence of novelty, the acceptance and utility of change as a further evidence, even as demonstration . . . if he has added a new and valuable article to the world's utilities he is entitled to the rank and protection of an inventor."

THE CLAIMS.

Of the claims of the Harmatta patent it will be sufficient to quote, as typical, claims 3, 8, 12 and 17, which are as follows:—

"3. *The herein described method* of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and *localizing the flow of current* and the heating throughout the operation *in a spot* or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots."

"8. The method of electrically welding two plates or sheets of metal together face to face between electrodes, consisting *in restricting the area of contact of an electrode with said plates to a spot*, passing a heating electric current from said electrode to the co-operating electrode through said spot to heat the work to welding temperature and *applying pressure to the work in line with said spot* to effect a welding of one plate to the other."

"12. The method of electrically welding two pieces of sheet metal to one another, consisting in pressing the sheets together by *pressure* applied and *localized* in a distinct well-defined point or spot on the rear surface of a sheet while passing an electric current through them in the line of the pressure, thereby *localizing the path of the heating current* from one to the other of the meeting surfaces of the sheets to cause the said sheets to be heated to welding temperature by the electric resistance of the work at said spot, and *applying pressure localized* over said spot whereby the pieces are welded together at a distinct well defined *spot* in their meeting surfaces *answering the purposes of a rivet.*"

"17. Metal plates fastened together by a number of *distinct or isolated welds on their meeting surfaces* and in spots *comprising meeting portions* of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being separated from one another by distinct unwelded areas."

Each of the method claims of the patent clearly defines the precise process of spot welding described in the specification of the Harmatta patent employing the localizing of the current by pointed electrodes to affect new modes of

electric and thermal operation, and the localizing of the pressure to act upon the spot to be welded which is surrounded by and integral with colder metal.

The product claims of the Harmatta process likewise define the specific spot welded product obtained by the Harmatta process in which the welded spots are formed from the metal of the plane sheets themselves.

Claims 7 to 16 of the Harmatta patent define in limited terms Harmatta's specific process of making spot welds in two plane sheets in facial contact by means of localizing the current and pressure by pointed electrodes.

The process claims, 1 to 6, and the product claims, 17 to 21, are expressed in somewhat broader terms, but in this case it is not necessary for the Court to give them any other or broader construction than as covering the specific process and its product described in Harmatta's specification. The defendant makes the precise Harmatta product by the specific Harmatta process.

CASES ON CONSTRUCTION OF CLAIMS.

It is a well established principle of law that the claims of a patent should be construed in accordance with the specification to cover the actual invention made by the patentee.

This fundamental principle of law is stated by the Supreme Court in *Rubber Company* v. *Goodyear*, 9 Wall. 788, 795:—

> "A patent should be construed in a liberal spirit, to sustain the just claims of the inventor. This principle is not to be carried so far as to exclude what is in it, or to interpolate anything which it does not contain. But liberality, rather than strictness, should prevail where the fate of the patent is involved, and the question to be decided is whether the inventor shall hold or lose the fruits of his genius and his labors."

In *Wicke* v. *Ostrum*, 103 U. S. 461, the Supreme Court said (p. 568):—

> "To make the claims of his letters-patent intelligible, they must be read in connection with the specifications to which they relate."

Where, as in this case, the product of the process is new it is well settled that the product claims should be held valid as covering the new product made by the process described in the patent. See

Cochrane v. *Badische Anilin & Soda Fabrik*, 111 U. S. 293, 296-310.

Smith v. *Goodyear Dental Vulcanite Co.*, 93 U. S. 486, 493.

Downes v. *Teter-Heany Development Co.*, 150 Fed. Rep. 122, C.C.A. 6th Cir.

Inasmuch as the defendant has practiced the exact process set forth in the Harmatta patent and has produced the articles made by that process, it has infringed all the claims of the patent when those claims are construed, no matter how narrowly, to cover that process and its product.

CHAPTER II.

THE HARMATTA FILE-WRAPPER

(Vol. II, pp. 1353–1466).

The history of the application for the Harmatta patent in the United States Patent Office is nothing but the usual story of the struggle of an applicant to obtain a patent for his real invention. Harmatta was especially handicapped in being a foreigner living in Hungary and he was further unfortunate in the selection of solicitors who were Canadians. In spite of these handicaps Harmatta through his solicitors persistently endeavored from the beginning to frame claims, based on the clear disclosure in his application as originally filed of the spot welding invention ultimately patented in the patent, which claims would meet the approval of the Patent Office.

Harmatta's original specification describes not only the process of spot welding, which necessarily results in the spot welded articles (pp. 1360, 1361), but also a process of *line* welding with beveled edge rollers. The roller process was almost immediately eliminated from the application by the amendment of May 10, 1904.

We are not concerned with this line roller welding but with that part of Harmatta's original specification which describes his spot welding process by which he obtained the spot welded articles.

His original specification stated (p. 1356):—

> "My invention relates to a process of and apparatus for manufacturing metal articles of all kinds, in particular those of the thinnest sheet metal by direct electric welding."

In this statement Harmatta definitely placed his invention in the art of electric welding created by Professor Thomson in which the welding heat is created directly in

the work itself at the joint between the articles to be welded by the resistance at and near that joint to the passage of the electric current which was of small voltage and large volume. He definitely excluded those processes which are not electric welding and which employ indirect methods of heating, such as electric arc (Benardos U. S. patent) or hot blocks (Benardos German patent) or by conduction (Thomson riveting patent No. 396,015).

As we have above pointed out, the conditions, inherent in direct electric welding, require the use in the welding circuit of conductors and electrodes of very low resistance, commonly made of copper and of large cross-section. They are so shown in the drawings (p. 1466) accompanying Harmatta's original specification.

The figures of the original application were six in number; of these figures 1 and 5 are figures 1 and 2 of the issued patent and the two parts of original figure 6 are figures 4 and 5 of the patent.

Figures 2 and 3 of the original specification show rollers for continuous *line* welding. These rollers are narrowed and pointed at the edges, so that, while having nothing to do with spot welding, they embodied Harmatta's new principle of operation of concentrating the current by the shape of the electrodes themselves. This is a distinct departure from the disclosure of the Thomson lap welding patent No. 444,928, in which the rollers are wide and overlap the work so that the work itself, and not the electrodes, concentrates the current and determines the extent of the weld. All reference to rollers in the specification was cancelled May 10, 1904 (p. 1366). At this time the figures of the drawings which relate to line roller welding were also eliminated. From this date the application described solely pointed electrode spot welding.

Concerning Fig. 1 (Fig. 1 of the patent) showing the pointed electrodes localizing or concentrating the current

and pressure for spot welding the original specification states (p. 1357):—

> "Fig. 1 is a view illustrating the welding of two metal sheets of equal thickness, intermittently or at certain *spots* only."

Of Fig. 5, now Fig. 2 of the patent, the original specification says:—

> "Fig. 5 is a side elevation of a welding device (also illustrated in part in Fig. 1) according to which the pressure is exercised by pin shaped electrodes, the form of which may be suited to the particular purpose in view, and which may be adapted to work on the smallest possible surface of contact."

The electrode spot weld is described as follows (p. 1358):—

> "As Fig. 1 shows, the two sheet metal or other bodies, the edges of which lie upon each other, are introduced between the two electrodes *a*, *b*. Of the latter the one, somewhat prior to welding or only during the welding operation, is pressed upon the other, as the arrow shows; or both electrodes may be caused to exert pressure on the objects to be welded."

The electrode spot welding is further described in the original specification (p. 1360):—

> "Thus if it is required to weld, for instance, sheets of metal only at particular places, the apparatus shown in Fig. 5 may be advantageously employed, the electrodes *a*, *b* having the form of pins. The lower electrode *b* is then inserted in the conductor *d* whilst the upper electrode *a* is carried by an arm *s* and can be turned by means of a hand-lever *t* carried by said arm *s* on the shaft *u* in such manner that *the*

> *points* of the electrodes *a*, *b* approach and recede from each other. If then two superposed sheet metal ends to be welded together are introduced between the electrodes, and the latter then firmly pressed together and the circuit closed, *a small round, very sharply defined place of welding is caused which perfectly answers the purposes of a rivet.* In this event, also, especially in the case of thin vessels, which are not required to withstand great pressure, the pressure on the place of welding may at the right moment be exactly regulated or kept within the proper limits."

This is a full and accurate description of the process of electrode spot welding which necessarily results in the spot welded articles.

This description is entirely adequate as a basis for both the method and article claims of the issued patent.

Of the claims of the original specification, the first two covered the process of electrode spot welding and were broad enough also to cover Harmatta's roller line welding which later he elected not to cover. Claims 3 and 4 were limited to roller line welding only (pp. 1361, 1362).

It seems to us unnecessary to follow in this brief the various amendments of the specification and claims by which the claims were limited from time to time. From these amendments it appears clearly that, instead of expanding his application, Harmatta was constantly making it more specific, and that he was at all times seeking a suitable claim to protect his invention.

For example, the claim accompanying the amendment of May 14, 1904, calls for—

> "The process of electrically welding thin sheets and the like, consisting in applying pressure *at the place of welding* of the two superposed metallic objects to be united, etc." (Vol. II, p. 1373.)

This claim was cancelled and another claim substituted in an amendment of November 26, 1904. This claim calls for an electric welding process—

> "Consisting in first pressing intimately together the two superposed metallic objects *at the very point* at which the welding joint is to be formed, and then whilst maintaining the intimate pressure, heating the objects by passing an electric current through them exactly *at said point* in which the welding is to be effected" (p. 1375).

This claim is unquestionably directed to Harmatta's process of spot welding.

Of the three claims filed in the amendment of November 17, 1905, the first calls for—

> "Passing an electric current through them [the sheets] *exactly at said point*, in which the welding is to be effected" (p. 1385).

The second claim calls for—

> "a pressure limited to a material *point*" and
> "a current also limited to said material *point*" (p. 1385).

In the substituted claim filed with the amendment of May 18, 1906, the process is described as—

> "applying suitable electrodes on the metallic objects *at the very point* at which the welding joint is to be formed", and applying the pressure and current (p. 1395).

The substitute specification filed December 3, 1906, contains a good description of the process of electrode spot welding. This specification says (p. 1399):—

> "My process consists in applying suitable electrodes

on the metallic sheets *at the very point* at which the welding joint is to be formed, then causing said electrodes to exert a pressure on the metallic sheets sufficiently to press the metallic sheets intimately together *at the point* at which the welding joint is to be formed, then heating the metallic sheets by passing an electric current through said electrodes and through the metallic sheets, and finally maintaining the pressure of said electrodes on the metallic sheets during the passage of the electric current through the electrodes and metallic sheets."

(p. 1402:) "*At the place where the electrodes a, b exert pressure* therefore (Figs. 2 and 3), that is to say, where the current is able to flow through the bodies to be welded without having to pass through a layer of air and form sparks, *the metal is heated to welding heat.* Immediately this temperature is reached, the continous pressure effects the desired union, that is to say, welding of the two thin metallic sheets 5 and 6, without injury by perforation or burning, in the manner explained, having taken place, even if the sheets are extremely thin."

The claim accompanying this specification (p. 1403) is in substance a repetition of the first paragraph of the description just quoted. It is plainly an attempt to define the process of electrode spot welding, the spot being referred to as a "point". This claim was rejected December 15, 1906 (p. 1404), and was cancelled and two new claims filed December 5, 1907 (p. 1405). The second of these claims clearly defines electrode spot welding, as follows (p. 1405):

"2. The process of electrically welding *thin* metallic sheets, consisting in *applying suitable electrodes on the metallic sheets at the very point of which the welding joint is to be formed*, then causing said electrodes to

exert a maximum pressure on the metallic sheets sufficiently to press the metallic sheets intimately together *at the point* at which the welding joint is to be formed, then heating the metallic sheets by passing an electric current through said electrodes and through the metallic sheets, and maintaining the maximum pressure of said electrodes on the metallic sheets during the passage of the electric current through the electrodes and metallic sheets."

This claim, while not as good a definition of electrode spot welding as are the claims of the issued Harmatta patent, is objectionable only because of its possible breadth.

The claim was finally rejected in the Patent Office action of February 9, 1909 (p. 1411), in which the Patent Office said:—

> *"It is thought that if there is any patentable matter in this case it resides in the securing of the sheet metal parts together by means of the small round, sharply defined place of welding which answers the purpose of a rivet, as is set forth on page 6 of the original specification."*

This states the invention exactly.

Harmatta adopted this suggestion of the Patent Office in his amendment of January 28, 1910, in which he filed an amended specification (pp. 1414-1417) with two claims aimed more specifically at the electrode spot welding process. In the remarks accompanying this specification he said (p. 1412):—

> *"Great care has been taken not to describe anything which was not illustrated or explained in the original disclosure."*

In the next Patent Office action of March 22, 1910 (p. 1418), claim 2 was said to be allowable, and claims 1,

5, 6, and 16-20 of the Rietzel patent No. 928,701, issued July 20, 1909, were suggested to Harmatta under the provisions of Patent Office Rule 96 for the purpose of exciting an interference. Thereupon in an amendment March 31, 1910, Harmatta added these Rietzel claims to his application.

The interference was declared April 26, 1910 (p. 1425), and to it claims 2-4 of Rietzel were added June 12, 1911 (p. 1430). This interference was decided in favor of Harmatta, October 17, 1912 (p. 1431). On October 23, 1912, Harmatta filed the specification and claims now appearing in his patent and the application was allowed October 31, 1912 (p. 1454).

There is nothing in the history of this Harmatta application but the common history of an applicant who has amended his application both as to the specification and claims in such a way as to define accurately the nature and scope of his invention.

Harmatta's original application included both electrode spot welding and line roller welding. Claims on the latter were rejected by the Patent Office and were dropped from his application by his amendment of May 10, 1904 (p. 1366), although we believe that he was entitled to claims properly limited to that process which was new with him.

Electrode spot welding he saw was new and he persisted from the beginning in seeking a claim adequate to protect that invention. He never desisted in his efforts to obtain suitable claims and when the Patent Office pointed out to him that his claims were too broad and that they should be limited to the making of a spot weld that would take the place of a rivet he proceeded to cut down the scope of his claims and to limit them more closely to his specific process and its product.

Harmatta had the right to use the knowledge that he

obtained from the art, including the Rietzel patent, to enable him to define properly and accurately his invention. There is nothing in the patent that is not fully described in the original specification. *The drawings are the same as those of the original specification. The claims both for his process and his product read upon the original description and drawings. Harmatta, therefore, was clearly entitled to these claims.*

The law is well established. It is stated in *General Electric Company* v. *Cooper Hewitt Electric Company*, 249 Fed. Rep. 61, C. C. A. 6th Cir., p. 64:—

> "The rule is that insertions by way of amendment in the description or drawing, or both, do not hurt the patent, if the insertions are only in amplification and explanation of what was already reasonably indicated to be within the invention for which protection was sought—'something that might be fairly deduced from the original application.' *Hobbs* v. *Beach*, 180 U. S. 383, 395, 21 Sup. Ct. 409, 45 L. Ed. 586; *Cleveland Co.* v. *Detroit Co.* (C. C. A. 6) 131 Fed. 753, 857, 68 C. C. A. 233; *Proudfit Co.* v. *Kalamazoo Co.* (C. C. A. 6) 230 Fed. 120, 123, 144 C. C. A. 418; *Cosper* v. *Gold*, 36 App. D. C. 302."

See also:

Hobbs v. *Beach*, 180 U. S. 383.

Western El. Co. v. *Sperry Co.*, 58 Fed. 186, C. C. A. 7th.

Gen. El. Co. v. *Morgan Gardner Co.*, 168 Fed. 52, C. C. A. 7th.

Process claims may be added to an application which had originally only claims for a machine.

John R. Williams Co. v. *Miller Co.*, 107 Fed. 290, 292.

Conversely, we submit, product claims may be properly added to an application which describes and claims a process which produces such product.

Harmatta's file wrapper discloses nothing but the usual struggle of an inventor to obtain a patent for his invention. Throughout he complied with all the requirements of the law and of the rules of the Patent Office.

CHAPTER III.

THE McBERTY PRIOR USE DEFENSE.

When a patent attains the commercial importance of the Harmatta patent, someone will almost always be found, as experience has shown, who, having perhaps dabbled in the general subject-matter in connection with which the invention was ultimately developed, pretends, and even makes himself think, that he made the invention long before the patentee. This was recognized and pointed out by the Supreme Court in the *Barbed Wire Patent* case, 143 U. S. 275, 284, where the court said that

> "almost every important patent, from the cotton gin of Whitney to the one under consideration, has been attacked by the testimony of witnesses who imagine that they had made similar discoveries long before the patentee had claimed to have invented his device."*

This is human nature. "The wish is father to the thought." Such claims are sometimes entirely fraudulent, but are often set up by men who are more or less unconscious that there is no real basis for their contention. There being a strong motive to create such a defence, and human memory being frail, it is easy for a man, particularly if he was so situated that he *might* have made the invention, to persuade himself that he is really entitled to the credit of some one else's great achievement; and corroborating witnesses can always be found who, under the stimulus of skilful suggestion, will subscribe to an essentially untrue structure of testimony.

The present case is no exception in this particular, for here we find as one of the chief defenses an alleged prior

*See also the *Telephone* and *Incandescent Lamp* cases referred to, page 188 *infra*.

use, claimed to have been carried on by one Fred B. McBerty in February, 1901, at Warren, Ohio.

It appears that McBerty, while in the employ of the Warren Electric & Specialty Company of Warren, Ohio, in February, 1901, was in charge of a butt welder machine which was in use for butt welding the ends of the guard rings of electric desk fans. These rings were the circular wires forming parts of the wire guard frame which enclosed the fan blades. The fan blades were secured by rivets to the arms of a center or "spider", the hub of which was fastened to the shaft of the electric motor. The defendant alleges that McBerty made some experiments with this butt welding machine in the course of which experiments he arrived at the idea of spot welding. It is even asserted (but as a belated emendation of the story), that by this spot welding process McBerty welded a "trayful" (about a dozen or fifteen) of fan blades and spiders which were assembled in completed fans and went into the regular commercial product of the Warren Company known as "Peerless" fans.

This McBerty prior use contention was not passed upon in the majority opinion of the Court of Appeals for the Sixth Circuit holding the Harmatta patent invalid for lack of invention. Judge Denison, in dissenting from the conclusion of the Court that the bill should be dismissed, must have found the defence to have failed.

The first and perhaps the most obvious answer to the McBerty story is that even if it were all true, it amounts only to an *abandoned experiment*, ineffective to defeat the Harmatta patent; for it is admitted that after the one alleged trayful of fan blades and spiders had been produced, the process was wholly abandoned by McBerty and the Warren Company, and that thereafter the company's fan blades were always *riveted to the spiders* as they had been before, the machine being continued in use only

for butt welding the guard rings, and no further spot welding experiments, or anything of the sort, ever having been performed on it. It is not asserted by McBerty that any of this alleged spot welding was done except between February 15, 1901, and the end of that month. McBerty never did any other spot welding on this or any other machine until many years later, long after the date of Harmatta's application. Nothing would ever have been heard about the 1901 McBerty experiments had it not been for the Harmatta patent and the necessity of building up a defense against it.

But the story *is not true;* in fact it is *demonstrably false.*

In the first place, the whole setting of the story and the history of its development are such as to make it improbable to the last degree. There are certain outstanding facts about it, requiring no detailed study of the record, and easy of comprehension, which in our opinion are of such controlling importance that this Court, on the basis of these facts alone, will reject the McBerty defense and find that the District Court was in error in sustaining it.

Briefly summarized, some of these salient outstanding facts are as follows:—

(1) The story first saw the light (in a very different form from its present form) in 1913, when McBerty, who was then an officer of a concern known as the National Electric Welder Company, which had been notified by the plaintiff, the Thomson Company, that it was infringing the Harmatta patent, worked up the defense in conjunction with his counsel, J. Nota McGill, and approached the Thomson Company with an offer to sell his "prior use" evidence to the Thomson Company, to be by that company suppressed, in consideration that his company should receive a license under the Harmatta patent on better terms than others were to receive,— a proposition which

was rejected by the Thomson Company with the contempt it deserved.

(2) The next appearance of the story was when McBerty, later on in the same year, 1913, communicated it to counsel for the defendant in the Barney & Berry case in the First Circuit. These counsel made a thorough investigation of it, collecting many affidavits with the aid of McBerty, who spent two weeks of his time helping them; and when the story was fully before them, these counsel decided that it would hurt and not help their case, for the reasons, first, that they did not believe it, and second, that even if it were true, all it amounted to was an abandoned experiment.

(3) After the decision of the Court of Appeals for the First Circuit sustaining the Harmatta patent in the Barney & Berry litigation, McBerty's company, the National Electric Welder Company, took a license under the Harmatta patent, in which license the validity of the patent was recognized,— conduct wholly inconsistent with McBerty's claims to prior invention.

(4) The story as now told by McBerty is a radical departure from the story told by him in 1913, to his own counsel and to counsel for the Barney & Berry Company, in many particulars. Two of the most significant are:

(a) The matter of the "trayful" of fan blades and spiders alleged to have been united by spot welding and to have gone into the commercial fans sold by the Warren Company was unthought of in 1913. In 1913 McBerty made no pretense that he had spot welded more than one spider to its blades and said definitely that no commercial use was made of the process. He did not even allege that this one fan blade structure was ever embodied in a finished fan. Now he says (evidently for the purpose of curing, if possible, the obvious defect of his previous story in that it showed nothing but an abandoned experiment), that all

the fan blades and spiders of about a dozen fans were spot welded by him, that the same were assembled into finished fans and that these went into the commercial output of the Warren Company.

(b) Although McBerty in 1913 told his own counsel that he was "unable to identify the exact date" when he "did this experimenting", he now comes forward with a *dated* alleged original sample of his work (Exhibit M) upon which is stamped the date "2/15/01", this having been deliberately fabricated, as we believe, for the purpose of supplying an element of proof previously lacking, namely, contemporaneous record evidence.

McBerty certainly never thought enough of his 1901 experiments to apply for a patent on the process he now claims that he then invented, although he has taken out many patents (Vol. I, p. 441).

His present company, the Federal Machine & Welder Company, is a manufacturer of machines to be used in infringement of the Harmatta patent (Vol. II, pp. 849, 850), so that he is strongly interested to defeat the patent.

These broad facts, all standing out on the face of the record, and requiring no detailed examination of the evidence, are enough, to say the least, to cause the Court to look with grave suspicion upon the story; and, coupled with the fact that it is admitted that the process was never carried any further than the welding of this one alleged "trayful of fans", a work which could not have occupied more than an hour or so, these facts are in our belief controlling, and require that the whole matter be dismissed as improbable and as at best an unsuccessful abandoned experiment.

But this is by no means all. When we come to analyze the story in detail, we shall find, as is usually the case in a situation of this kind, that when subjected to careful

analysis it breaks down *in details*. We shall, later, fully discuss these details and the inherent contradictions in the story as told.

But outside of these contradictions and the entire failure to make out a consistent story *there are at least three reasons why it is not possible that McBerty's story can be true*, namely:—

(a) That the butt welding machine on which McBerty alleges that he did this work did not have room to insert the fan blades and spiders which he says he spot welded on it;

(b) That the machine did not have a transformer capable of supplying enough current to it to do spot welding; and

(c) That McBerty did not have in 1901 the sheet steel spiders which he says that he then spot welded.

Moreover *the only concrete items of evidence* which defendant produces to support McBerty's present story utterly fail to do so: —

(d) The 1901 catalogue of the Warren Company, which is alleged to show a cut of a fan with spot welded blades, is proved by defendant's own witnesses to have been gotten out months before the machine was built on which McBerty asserts that he did his spot welding so that the cut could not have been made from a fan with such blades; and

(e) "Defendant's Exhibit M", the piece of a spot welded spider and fan blade stamped with the date "2/15/01" and with McBerty's name, is clearly spurious and fraudulent.

The demonstration of these points — each of them fatal to McBerty's contention — will require a great deal of patience on the part of the Court, as it involves a necessarily tedious analysis of the testimony.

We shall first direct the Court's attention to the broad outstanding facts in the situation which we have above suggested; we shall then ask the Court's patient consideration of the evidence which in our view positively proves that the McBerty story cannot be true; and we shall particularly discuss the misleading catalogue cut and the alleged specimens upon which McBerty relies, and consider the evidence of the "corroborating witnesses".

McBERTY'S EFFORT TO SELL HIS EVIDENCE TO THE THOMSON COMPANY.

In December, 1912, when the Harmatta patent issued, McBerty was a half owner and the active manager of the National Electric Welder Company (Vol. II, p. 848), which company he had formed in 1911 to manufacture electric welding machines for both butt welding and spot welding. (The Harmatta process had been introduced in the United States in 1904 at the works of the National Enameling & Stamping Company, of Baltimore, Maryland, and prior to 1911 this company had built and put into use many spot welding machines (*supra*, p. 14), so that by this time spot welding was common knowledge and McBerty was entirely familiar with it.)

Upon the issuance of the Harmatta patent, notice of infringement was immediately served on McBerty's company, the National Electric Welder Company (Vol. II, p. 745).

Then McBerty, who had unquestionably set up in the plant of the Warren Company in 1901 a butt welding machine and very likely had done some unsuccessful experimenting of some sort on it, bethought himself of these abandoned experiments, and saw a chance, by distorting and enlarging upon them, of working up a case of alleged "prior use" which might enable him to make terms with the Thomson Electric Welding Company, plaintiff's prede-

cessor, owner of the Harmatta patent. He consulted his attorney, J. Nota McGill, got up some affidavits and *attempted to sell this evidence to the Thomson Company, to be by that company suppressed.*

McBerty's animus in the matter is shown by the very first letter which he wrote to his counsel, J. Nota McGill, December 9, 1912. McBerty said in that letter (Vol. II, p. 950):—

> "I have been looking up my witnesses and etc., on this matter, and *if we have any chance at all* I am confident that we can either put up an extraordinary good fight *or be in a position to ask the Thomson Company for a satisfactory settlement.*"

A "settlement" was what he was looking for.

Mr. McGill, replying to this suggestion as to a settlement with the Thomson Company on the basis of this evidence, said in his letter to McBerty under date of December 13, 1912 (Vol. II, p. 949):—

> "In thinking over the Harmatta patent, it occurs to me that it might be to your interests not to enter into any alliance with other manufacturers having for its object the making of terms with the Thomson Company. If your evidence is as it now appears to be sufficient to invalidate the Harmatta patent,* the Thomson people would doubtless be willing to negotiate with you on satisfactory terms, provided they were not compelled to similarly deal with your competitors. If there is any reason for giving the latter the benefit of the defense you have, then of course they will continue to be competitors. I suggest these things for your consideration."

Mr. McGill, in a letter to McBerty's company dated

*This remark was made before Mr. McGill had made any investigation whatever of McBerty's claims.

January 4, 1913 (Vol. II, p. 943), after stating that he has written a letter to the Thomson people about the matter, goes on to say that "*the affidavits submitted are not wholly sufficient*, but I do not want to suggest any change until after I see the machine", and adds:—

> "*If the Thomson people will grant you a license you can afford to surrender your evidence.*"

Thereupon McBerty armed with affidavits from Brown and Lipps, whose later affidavits are in evidence (Vol. I, pp. 478, 450), called on Mr. Fish, of counsel for the Thomson Company, in the hope of arranging for some settlement on the lines suggested. Mr. Fish, after hearing McBerty's story, told him, as McBerty himself admits, that on his own statement the whole matter was only "*an abandoned experiment*" which was not sufficient to defeat the patent (Vol. II, p. 753).

McBerty's proposition was, as he himself testifies, that the Thomson Company should

> "*buy me out*" (p. 753).

This proposition was of course declined by the Thomson Company.

Thus McBerty's effort to sell himself and his evidence to the Thomson Company failed. **He was willing "to surrender" his "evidence" upon condition that he himself should receive a consideration either in the form of a license under the patent on more favorable terms than other manufacturers, or in the form of an outright purchase price.**

McBerty's proposition was little short of blackmail and the suggestion that in the event of a trade the evidence should be surrendered,— that is that the defense should be suppressed,— would have been a gross fraud on the public, who were entitled to the defense, if it in fact existed.

McBerty's course in this matter reflects anything but credit upon his own honesty and credibility.

The reasons for McBerty's bitter enmity against the Thomson Company and for his determination to break the Harmatta patent by any means possible are thus made obvious.

Such an attempt to sell the proofs of an alleged prior use casts discredit on the veracity and good faith of the person who claims to have made that use, and gives good ground for rejecting the story.

In *Chadeloid Chemical Co.* v. *Thurston Co.*, 220 Fed. Rep. 685, before Judge Sanborn, in the District Court of the Northern District of Illinois, there was urged an alleged prior use based mainly on the testimony of men who had attempted to sell the evidence of priority to the patent owner with an offer to destroy the proofs. The court said:—

> "The facts recited are so flagrant (to say the least) that no court would be justified in paying the slightest attention to this prior use evidence, since the testimony of Hulin and Matthes is vital." (Page 693.)

COUNSEL FOR THE BARNEY & BERRY COMPANY THOROUGHLY INVESTIGATED THE McBERTY STORY, CONCLUDED THAT IT AMOUNTED TO NOTHING AND DECIDED NOT TO RELY ON IT IN THE BARNEY & BERRY CASE.

Balked in his efforts to sell himself and his evidence to the plaintiff, McBerty in 1913 put the whole story in the hands of Messrs. Edwards, Sager & Wooster, counsel for the Barney & Berry Company, which was then being sued in the First Circuit by the plaintiff on the Harmatta patent, and spent *two weeks of his time* assisting Mr. Howe of that firm to collect the evidence, taking him around to see all the witnesses and aiding in the drawing of numerous

affidavits (Howe, Vol. I, p. 300, Q. 7). In the course of this investigation Mr. Howe, with McBerty's help, collected affidavits from the following witnesses in addition to McBerty himself, namely:— Lipps, Browne, Gilder, Meeney, Estabrook, Bean, Wolcott, Bettiker, McCurdy, Lewis, Bechtel, Pendleton, Pilz, Wakefield, Ulp and Pfile, — all of which affidavits are in evidence and printed in Vol. I of the record, pp. 450–483.

This mass of testimony was carefully investigated not only by Mr. Howe, but also by Mr. C. V. Edwards, head of the firm of Edwards, Sager & Wooster and one of the most experienced and successful patent lawyers at the New York bar, Mr. Edwards himself also having a talk with McBerty personally; and these attorneys decided both that McBerty's story was not entitled to belief, and that if it were true it showed only an abandoned experiment which would not anticipate the patent (Vol. I, p. 292, Q. 12). Mr. Edwards testifies that it was decided not to rely on this "prior use" as a defense in the Barney & Berry case,

> "First, because after reading the affidavits and after hearing Mr. McBerty's version, **neither I nor Mr. Sager nor Mr. Warren* believed the story.**
>
> "Second, because it seems to me that even if all that Mr. McBerty said had happened, had actually happened, **it was nothing more than an accidental experiment,** and whatever its nature was, it was evidently considered by him to be useless for any practical purpose." (Vol. 1, p. 292.)

Naturally Mr. Edwards decided not to prejudice his

*Mr. Warren was the General Manager of the Toledo Electric Welding Company which was the manufacturer of the infringing spot welder used by the Barney & Berry Company, the defendant in the Massachusetts Case, the defense of which the Toledo Company assumed.

chances in the Barney & Berry case by relying upon any such defense. All this is brought out in Mr. Edwards' deposition in the present case (Vol. I, p. 288) taken by us in answer to the scandalous charges made on behalf of defendant to the effect that the evidence of the alleged McBerty prior use was wrongfully suppressed by Mr. Edwards and that the case was collusively tried.

FOLLOWING THE DECISION IN THE BARNEY & BERRY CASE, McBERTY'S COMPANY TOOK A LICENSE UNDER THE HARMATTA PATENT AND ADMITTED ITS VALIDITY.

After the final decision of the Court of Appeals for the First Circuit holding valid the Harmatta patent, the National Electric Welder Company, of which McBerty was active manager, took a license from the Thomson Company under the Harmatta and other patents.

These facts are brought out in the opinion of Judge Westenhaver in *Thomson Spot Welder Company* v. *National Electric Welder Company*, 260 Fed. Rep. 223, a suit on the license contract, who states as follows:—

> "Complainant's patent, No. 1,046,066, issued to Johann Harmatta, has been adjudicated to be valid by the United States Circuit Court of Appeals of the First Circuit. This adjudication became final in July, 1916. *Thereafter complainant entered into a license agreement with the defendant, the National Electric Welder Company, granting it permission to use the Harmatta and other patents owned by complainant* until the expiration of the Harmatta patent. This agreement, in addition to other terms, contains a clause whereby the National Electric Welder Company *admits the validity of the Harmatta patent*, and of all patents relating to spot or point welding machines now owned by complainant, and agreed not to ques-

tion or contest, during the life of said Harmatta patent, the validity or terms thereof, or the application thereof to the process of spot or point welding machines utilized therefor. Substantially all other makers of machines for the utilization of this process, it is alleged, have entered into similar license agreements." . . .

"*The conduct, in particular, of Fred P. McBerty, active manager of the National Electric Welder Company, shows a course of conduct directly inconsistent with a past purpose or with a sincere intention to observe in good faith that part of the agreement binding the National Electric Welder Company not to question or contest the validity of the Harmatta patent.* His co-operation with other defendants over a long period, in procuring evidence, making experiments, and planning for an attack on the Harmatta patent, is not justified by the excuses put forward in his behalf, namely, that evidence of prior use in his possession may be forced from him by legal process."

The conduct of McBerty in taking a license for his company, the National Electric Welder Company, under the Harmatta patent, in which license the validity of the patent was recognized, is, we submit, *wholly inconsistent* with the claim he now makes that he himself originated the invention covered by this patent.

McBERTY'S PRESENT STORY DEPARTS FROM AND ENLARGES UPON HIS 1913 STORY NOTABLY IN TWO ESSENTIAL PARTICULARS.

As we have shown, in the year 1913 McBerty told his story at length to his own attorney, J. Nota McGill, and worked up affidavits for the purpose of "selling out" his evidence to the plaintiff, for suppression; and thereafter again, in the same year, he told it to Mr. Howe, of Edwards,

Sager & Wooster, attorneys for the Barney & Berry Company; and at that time personally assisted Mr. Howe in collecting affidavits and evidence in support of his story, besides himself giving a long and full affidavit to Mr. Howe.

It is very fortunate that we have now the full detail of the story as it was told by McBerty in 1913; for a comparison between the 1913 version and the present version, shows most radical discrepancies. The two stories are very different. In particular that told in the present record varies from that told in 1913 by the incorporation in it of at least two most significant and surprising additions, designed to overcome two fatal deficiencies in the 1913 version — the lack of any pretense of commercial use — and the lack of contemporaneous record evidence. There is no hint in the 1913 story of the alleged facts on which these additions are based. They appear for the first time in the testimony in this case.

McBERTY'S STORY OF 1913.

The subject was opened by McBerty in a letter to his attorney, Mr. McGill, dated December 9, 1912 (Vol. II, p. 950). In this letter he acknowledges receipt of a copy of the Harmatta patent, and adds:—

> "In connection with this subject I am interested in knowing whether, *if* I manufactured a machine and did spot welding on it before the application was made in England or the United States in a satisfactory and practical manner, would this have bearing on the granting of the patent at the present date to the Thomson Company.
>
> "I have been looking up my witnesses and etc. on this matter, and if we have any chance at all I am confident that we can either put up an extraordinary good fight or be in a position to ask the Thomson Company for a satisfactory settlement."

Mr. McGill replied under date of December 10, 1912, to the effect that such machine would constitute an anticipation of Harmatta,—

> "*provided it was not an abandoned experiment.* In other words *if the machine was constructed and used in an experimental way and then abandoned it will not be available as a defense.* If, on the other hand, it was long in use and was used where it could be seen by people connected with the establishment, it would constitute a good defense." (Vol. II, p. 951.)

Thereupon, under date of January 2, 1912 (an obvious mistake for January 2, 1913), McBerty wrote another letter to McGill (Vol. II, p. 944) describing his efforts to get statements from witnesses, referring to the fact that the welding machine on which he did the spot welding was originally designed for a butt welder, pointing out that the transformer used with this machine was shown by the books to have been turned over on January 25, 1901, to the fan department of the Warren Company, and then making this significant statement:—

> "I have also samples of spot welding which was done on the welder at the time *we did this experimenting*, and while *we are unable to identify the exact date* we can approximate it within two or three months."

We call attention in passing that *this is a plain statement that he did not have at that time a dated specimen of his work such as he now pretends to produce as his Exhibit M.* If he had had Exhibit M when he wrote this letter he could not possibly have written it, because one of the very samples he was talking about would have borne upon its face the evidence to "identify the exact date". He does not now assert that Exhibit M was only found by him after the

letter was written, but says that he had found it in his tool box in 1911 or 1912 (Vol. II, p. 840, X-Q. 784).

McBerty's next letter to McGill, February 10, 1913, explains that the Warren Company after "this experimenting", abandoned the idea of uniting the fan blades and centre spiders by welding because the dies which they then had to stamp out the blades also punched the rivet holes required for the rivets by which they united the blades to the spiders, and if spot welding were to be employed no such rivet holes should be punched on account of their unsightly appearance. It would therefore have been necessary to go to the expense of getting new dies which would stamp out blades without punching rivet holes (Vol. II, p. 947).

McBerty's next step was to try to induce the Thomson Company to buy out his evidence for the purpose of suppressing it, as above pointed out, and when this attempt failed he was in a good mood to put up the "extraordinary good fight" mentioned in his letter to McGill of December 9, 1912 (Vol. II, p. 950).

His opportunity came in the Barney & Berry suit when counsel for the Toledo Electric Welder Company, which was defending that suit, sought to make the defense of the McBerty prior use. Mr. McGill first turned over all the data in his possession to Mr. Edwards, of counsel for the Toledo people, in September, 1913 (McBerty, Vol. II, p. 762, Q. 280); and later McBerty assisted Mr. Howe in a full and careful investigation which was completed in October, 1913 (Vol. I, p. 300).

The detailed McBerty affidavit prepared at that time (Vol. I, p. 437), 1913, should be carefully read in order that the Court may have well in mind *the maximum extent of the assertions made by McBerty in 1913.* This affidavit occupies eleven printed pages and was sworn to on October 9, 1913. It must not be forgotten that even this affidavit was made twelve years after the alleged date of the ex-

periments which it purports to describe. There is no reason why even then McBerty and his other witnesses should have more than the vaguest recollection of what had happened so many years before; but certainly their recollection in 1913 is as good as their recollection when they testified in this case six years later.

McBerty, in the 1913 affidavit, says that he desired to produce a cheaper fan for the season of 1901, and that he decided to make parts of this cheaper fan of iron instead of brass, and to unite the ends of the guard rings by butt welding, and describes the building and use of his butt welding machine. As to spot welding, he says (p. 440):—

> "I demonstrated to my own satisfaction and also that of others that the machine would butt weld satisfactorily, . . . and also that sheets or plates of metal could be welded together in spots less in area than the overlapping portions of the plates."

He then explains how this was done, and proceeds to describe (p. 441) the spot welding which he says he did. This is what he says (p. 442):—

> "In demonstrating the practicability of this idea **I took one of the steel fan blades and centers** and welded the blades to the center arm, each blade being secured to the arm by a number of welds in different spots. This was done by me in the spring of 1901, this being the time the machine was finished and its capability of butt welding the ends of the fan guard rings demonstrated."

This is *absolutely all* that McBerty, in this carefully prepared affidavit of 1913, claimed to have done by way of spot welding. He asserts only that in *one case* he welded the four fan blades to the centre or spider, and *he does not even assert that in this one case was this welded structure*

put into a complete fan, with motor, guard, etc. Indeed, in the portion of *the affidavit immediately following that* above quoted, he seems to say that this one welded structure was cut up by him and one blade of it (produced and marked Exhibit O attached to his affidavit) kept as a specimen of the work, the rest apparently being thrown away. **There is not the least hint that he used the spot welding process to unite fan blades and spiders of a dozen or fifteen fans, and that these went into the regular commercial output of the Warren Company and were sold, or even that he spot welded one spider to its blades, which went into a fan that was sold.**

The rest of the affidavit consists mainly of an explanation of the manner of operating the welding machine and of an explanation of the reasons why spot welding was not used in the commercial manufacture of the fans.

Those reasons were that the fan blades and spiders already in stock had been punched for rivets, and it would make a botched job to have open rivet holes in blades united to the spiders by spot welding,* that as the punching had been done there would be no saving in spot welding over riveting, that further expenditure would be necessary to make the tools and jigs necessary to perform the spot welding, that as it was in the month of February, which was well along in the fan season, it would be impracticable to make a change for that season, that the riveted fans

*A significant circumstance in this connection is that while McBerty in this affidavit of 1913, asserted that a principal reason why the spot welding of blades to spiders was not adopted was because the fan blades were already punched with rivet holes (see also McBerty's letter to McGill, February 10, 1913, Vol. II, p. 947; Lipps' affidavit, Vol. I, p. 454; Brown's affidavit, Vol. I, p. 484), such punching is flatly denied by McBerty in his testimony in this case (Vol. II, p. 740) because he wishes to contend that he spot welded blades to spiders that were put on fans that were sold. Fans with blades having unfilled rivet holes would have been unsalable.

had proved satisfactory, and that they did not want a second set of apparatus or a duplicate set of unpunched stock, as would be necessary for the spot welded fans (Vol. I, p. 443).

None of these reasons would have prevented the spot welding of fan blades for the succeeding season of 1902 or subsequent seasons. The admitted fact that no attempt was made to do such spot welding in 1902 or later is a strong indication that *the real reason* for its non-user was that McBerty had never in fact practiced that process in 1901, or that if he had tried experiments pointing in that direction he had accomplished nothing and abandoned the idea as a failure.

The principal other persons whose affidavits were obtained in 1913 by Mr. Howe were E. C. Lipps (Vol. I, p. 450) and Frank G. Brown (p. 478), each of whom executed an affidavit on October 6, 1913.

The affidavit of Lipps may be summarized: That in the year 1901 he was employed until *April 29* at Cleveland when he returned to Warren and entered the employ of the Trumbull Mfg. Company (this date being fixed by his time book), that while in the employ of the Trumbull Company he frequently visited McBerty and that on one of his visits he found McBerty "putting in a transformer of larger capacity" in the welding machine, that spot welding as well as butt welding was performed on the machine and he produces "Exhibit H" attached to his affidavit "as a kind of a sample" of the welding done, that he saw steel fan blades welded to the hub arms in a number of distinct spots, that McBerty told him that "he proposed the use of the spot welding of the fan blades to the centers in producing a commercial cheap grade of fans," that the fan blades were "drilled" with rivet holes, that the spot welding of the fan blades to the centers as proposed by Mr. McBerty "was not adopted commercially," that

"at that time the space between the clamp arms" of the machine "was not sufficiently deep to permit the sheets to be welded together to extend sufficiently low down when placed between the electrodes" so that "we bent the ends of these electrodes upwardly so as to allow the sheets of metal to enter between the sheets of the electrodes at a sufficient extent to place the weld at a spot desired", that "in the original machine" the two pieces of the base plate "were separated by a piece of fibre to insulate them which extended the whole length of the base plate", and that later the "fibre piece was cut out directly under the spot where the weld was made".

Many of these statements absolutely contradict McBerty in the essential features of his testimony in the present case as we shall show.

Brown's affidavit, Vol. I, p. 478, is to the effect that he was in the employ of the Packard Motor Car Company of Warren in 1901, that one Sunday "previous to May 6, 1901," he visited McBerty who told him that he had done spot welding on his machine, that he saw no spot welding done, that he produces a fan blade spot welded to an arm cut from a fan center or spider marked "Exhibit B" as a specimen "precisely the same" as those shown him by McBerty. He confirms McBerty's statement that the fan blades at that time were "punched for rivets in accordance with the practice of the Company, which had always employed rivets for this purpose," and that the securing of the fan blades by spot welding was not adopted by the Warren Company.

There is no hint in the affidavits of Lipps and Brown (or in the affidavits of others), all of which were prepared under McBerty's supervision, of anything but a futile and abandoned experiment, which, if Lipp's Exhibit H is a true specimen, never amounted to spot welding in any sense, as we shall show (*infra*, p. 177).

The other affidavits (pp. 463–477) add nothing whatever of consequence to McBerty's own story.

None of the 1913 *affidavits, including that of McBerty himself, suggest or hint that any spiders having welded blades went into complete fans that were sold, or indeed that any one such complete spot welded spider and blade structure ever was made as a commercial product.*

Mr. Howe, who obtained the affidavits as the basis of making a defense of prior use in the Barney & Berry case, was, of course, very eager to get evidence that spot welding had been practically used by McBerty and that what he had done was not a mere abandoned experiment, but he was definitely told by McBerty that there had been no commercial use of the process. Mr. Howe testifies (Vol. I, p. 302, Q. 11):—

> "He (McBerty) said that they had made one fan, one complete structure — by a complete structure I mean the central part which has been referred to as spider, with a blade secured to each of the arms of the spider. In this connection I was very insistent to learn if more of these fan blade structures had not been made, and especially I was desirous of establishing that there had been some commercial use made of these fan structures, because I believe this would have made our case of prior use immeasurably stronger; but *I was unable to find out by McBerty or any one that there had been a commercial use of them, in fact* **was told there was no commercial use;** the reason was that Mr. Gillmer [the president of the Warren Company] had decided not to put them into commercial use because of financial considerations, and that ended the matter."

In fact, as Mr. Howe testifies, McBerty did not even assert that "a complete fan structure, that is, including the

motor, fan, guard, etc., and including spot welded blades, had been built" at that or any other time (Howe, Q. 12, p. 303).

McBerty likewise told Mr. Edwards that no spot welded fan blade "had been sold or put into use and that none had been welded except upon the one occasion referred to" (Edwards, Vol. I, p. 292, Q. 11).

In answer to this clear and definite testimony of both Mr. Howe and Mr. Edwards, McBerty has only two mutually contradictory statements to offer.

He said in his first deposition that *he did not recollect whether or not he told Mr. Howe about the fans going into commercial use.* We quote his testimony (Vol. II, p. 865):

> "*X-Q.* 1140. Did you tell Mr. Howe of any assembled fans with these spot welded spiders and blades?
>
> *A.* I don't definitely recollect that, either.
>
> *X-Q.* 1141. Did Mr. Howe ask you about that?
>
> *A.* That I couldn't say.
>
> *X-Q.* 1142. Don't you recall that it interested Mr. Howe to know whether these spot welded spiders and fans had gone into commercial use?
>
> *A.* It would, yes, sir.
>
> *X-Q.* 1143. *But you don't recollect telling him?*
>
> *A. No.*
>
> *X-Q.* 1144. *That was a point you either held back or didn't know about?*
>
> *A. I didn't know about definitely.*"

Later on, apparently realizing the fatal character of this admission that he in 1913 did not know definitely whether any spot welded fans went into commercial use, and that he did not recall telling Mr. Howe about the matter, he recants from this position in a second deposition and testifies (Vol. II, p. 960, Q. 6) that he *did* tell Mr. Howe

about these spot welded complete fans which went out to the trade in 1913.

It is perfectly clear that the testimony of such a witness is not to be accepted against the word of these two highly reputable lawyers, Mr. Edwards and Mr. Howe; and indeed it goes without saying that anything and everything which McBerty had told Mr. Howe about any commercial use, would certainly have been incorporated in the affidavit by Mr. Howe, who was intensely interested in showing commercial use if possible.

Mr. Howe also recognized the extreme importance of getting *contemporaneous record evidence* of the date when the work was done. He says (Vol. I, p. 302):—

> "I was somewhat concerned in the case because almost everything seemed to depend upon recollection of the persons who knew anything about the matter, and I was therefore especially urgent to get some documentary evidence or contemporaneously dated articles of some kind which would corroborate the recollection of the witnesses. Such material seemed very scarce, and *I again and again urged it upon Mr. McBerty that it would be of very great assistance if some such contemporaneous material could be obtained.* We scanned the situation again and again, and apparently Mr. McBerty did everything that was possible for him to do to produce all the tangible date evidence that he could."

No such date evidence was produced.

On the McBerty story as told in 1913, first to his attorney, McGill, and later as set forth to its fullest extent both in McBerty's own affidavit and in the affidavits of others prepared with his assistance, absolutely no argument can be made of an effective prior use. The situation lacked two absolutely vital essentials

of a successful prior use defense, namely: *first*, the element of commercial use as distinguished from abandoned experiment, and, *second*, contemporaneous record date evidence.

It was after all this evidence had been collected and considered that McBerty took a license for his company, the National Electric Welder Company, in which the validity of the Harmatta patent was admitted (*supra*, p. 133).

Then, in 1917, the so-called "Welding Patents Investigating Committee", an association of manufacturers and users of unlicensed spot welding machines, was organized to fight the Harmatta patent, and this aggregation got in touch with McBerty, and through him has presented in this case a reconstruction of his old discredited story, the futility of which McBerty had himself practically admitted by taking a license under the Harmatta patent.

McBERTY'S PRESENT STORY.

McBerty's story had been rejected by Mr. Edwards first, as incredible and as obviously an abandoned experiment. The fact that it showed no commercial use of spot welded fans was a most important circumstance in fixing its experimental character. There was no contemporaneous evidence as to the date of the experiments. Mr. Howe had "again and again urged it upon" him that it would be of very great assistance if some commercial use could be established and some "contemporaneously dated articles" could be found (*supra*, p. 144).

These points were not lost upon so resourceful a man as Mr. McBerty; and so when he took the stand in this case six years later he was prepared to meet *both* difficulties.

First. McBerty now asserts that a trayful (some twelve or fifteen) of spot welded blades and spiders were put together by him and went into completed fans as part of the regular commercial output of the factory. This *new*

addition to the story is put in for the obvious purpose of attempting to overcome the fatal objection to the whole defense that at best it amounted to nothing but an abandoned experiment.

Second. McBerty now produces his "Exhibit M", a fan blade spot welded to a portion of a spider and bearing stamped on its face the date "2-15-01" and the name "F. McBerty". This is produced in order to supply the necessity for contemporaneous record date evidence, hitherto lacking. This Exhibit M, McBerty says, he dug up from his tool box in 1911 or 1912 (X-Q. 784, Vol. II, p. 840). But in his letter to his own attorney, McGill, of January 2, 1913 (the letter is dated by mistake January 2, 1912, but the context shows that it was really January 2, 1913), McBerty said:—

> "I have also samples of spot welding which was done on the welder at the time we did this experimenting, and while **we are unable to identify the exact date** we can approximate it within two or three months." (Vol. II, p. 945.)

This is utterly inconsistent with the existence at that time of the dated Exhibit M which McBerty says he had found a year or two before. This sort of thing was exactly what Mr. Howe was looking for; and McBerty's only explanation of why Howe did not see it is that he (McBerty) deliberately suppressed it (X-Q. 823, Vol. II, p. 842), — an explanation which is, we submit, obviously not entitled to belief.

If all that McBerty now says were true, the defense of prior use would still fail, because his alleged operations, even so, did not amount to more than an abandoned experiment. His alleged work on the fan blades and spiders was done in less than a week (X-Q. 445, Vol. II, p. 821) and could have been done in an hour or so if done

at ordinary speed (X-Q. 459). The fact, if it be a fact, that in the course of that experiment a trayful of fan blades and spiders were spot welded and were put into fans as part of the commercial output of the factory is very far from being a practical commercial use of the process. This we,shall discuss more fully in a subsequent section (p. 206).

But McBerty's story, emphatically, is *not* true

THE EVIDENCE PROVES POSITIVELY THAT McBERTY'S STORY CANNOT BE TRUE.

We have now set forth certain broad and, as we believe, controlling facts about the McBerty defense which are easily stated and require no particular study of the record. We have shown that the story was first developed in 1913 — about twelve years after the alleged work was done — as a means for inducing the Thomson Company to give McBerty's company a license under the Harmatta patent on more favorable terms than others were to receive; that McBerty first attempted to sell his "evidence" to the Thomson Company for suppression, for the consideration that his company should be given such a license under the Harmatta patent, or for an outright purchase price, which proposition was rejected by the Thomson Company; that thereupon McBerty told the story to counsel for the Barney & Berry Company, and that these counsel made a very thorough investigation of it with McBerty's assistance, and concluded that it was not true, and that if true it amounted only to an abandoned experiment; that following the decision sustaining the Harmatta patent in the Barney & Berry case, McBerty for his company took a license under the Harmatta patent, admitting its validity; and, finally, that the story he now tells differs from and enlarges upon the 1913 story as told to his own counsel and to counsel for the Barney & Berry Company in the

two vital points, namely, the "trayful of fans" and the dated Exhibit M, without which additions no argument could possibly be made for an effective prior use. We believe that these broad facts, coupled with the admitted abandonment of the process after the making of the single alleged trayful of fans, point unerringly to the conclusion that the McBerty operations, whatever they were, amounted only to an unsuccessful abandoned experiment, insufficient to anticipate the Harmatta patent in suit.

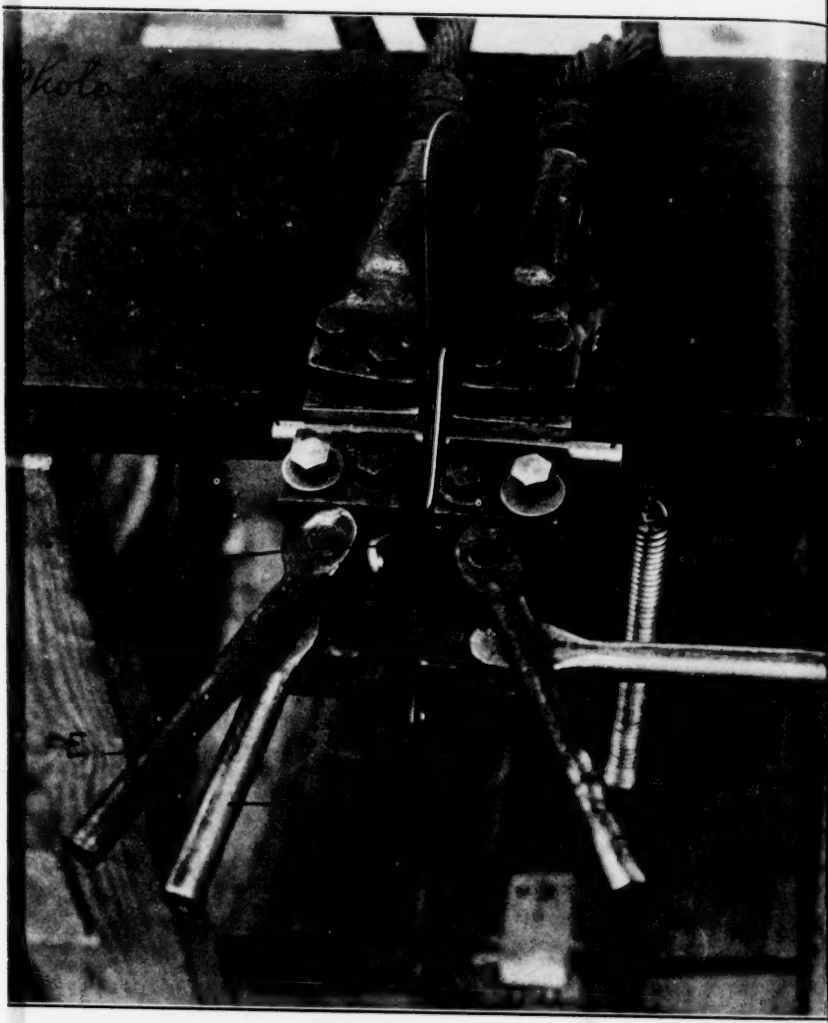
At the outset of this discussion we stated that a story of this kind, unless it is true, usually breaks down when its details are carefully analyzed and patiently tested, and that in the present case it is definitely proved by certain demonstrated facts that McBerty's story is not and cannot be true. We now proceed to state these facts,— a process which will inevitably require a detailed consideration of the evidence. Later we shall show other fatal inconsistencies in the details of the testimony which we believe refutes itself. The two propositions of a broader character which we now advance are these:—

(1) That the butt welding machine on which McBerty claims to have done his spot welding in 1901 was incapable of doing the work he claims to have done on it, for two reasons: (a) because there was no room in the machine for the insertion of a fan spider with or without four blades attached to it, such as McBerty says he spot welded on the machine; and (b) because the transformer with which that machine was equipped in 1901 was incapable of delivering a current sufficient to do spot welding, although adequate for the butt welding for which it was designed.

(2) That in 1901 there were no such sheet steel spiders available to McBerty as he says he welded to the fan blades.

We now proceed to consider these propositions in order.

DEFENDANT'S EXHIBIT B.



THE SPACE LIMITATIONS ON McBERTY'S 1901 MACHINE WERE SUCH AS TO MAKE IT IMPOSSIBLE TO SPOT WELD FAN BLADES TO FAN CENTRES ON THAT MACHINE.

There is in evidence as Defendant's Exhibit B a machine alleged to embody certain physical parts of McBerty's 1901 butt welder, on which he claims to have done his spot welding, but this exhibit is admittedly only a recent reconstruction and differs from the 1901 machine in at least two vital respects — in its assemblage and manner of mounting on the bench and in the transformer used with it.

We show on the opposite page a photograph of this machine *as it is now set up*. It is composed of two movable platens marked respectively A and B, each mounted pivotally upon an angle iron (lettered respectively C and D) and each supplied with current from the opposite poles of a transformer, not shown in the photograph. G, G are copper electrodes held tightly by sliding clamp jaws operated by the cam handles E, E and fastened in position by nuts. In the photograph the fan spider or centre is shown at H, and a fan blade to be welded to the spider at I. F, F are cam levers or handles pivoted respectively on the two angle bars which bear respectively against the platens A and B. When these handles are moved, they operate to force the platens A and B toward each other and therefore to press the electrodes G, G carried by these platens A and B into close contact with the work to be welded. When the current is turned on, a welding heat is generated in the work between the electrodes and when these electrodes are forced together by means of the handles F, F the weld is completed.

The only parts of this device Exhibit B claimed to have been present in the 1901 machine are the two angle irons constituting base plates on which the movable platens are

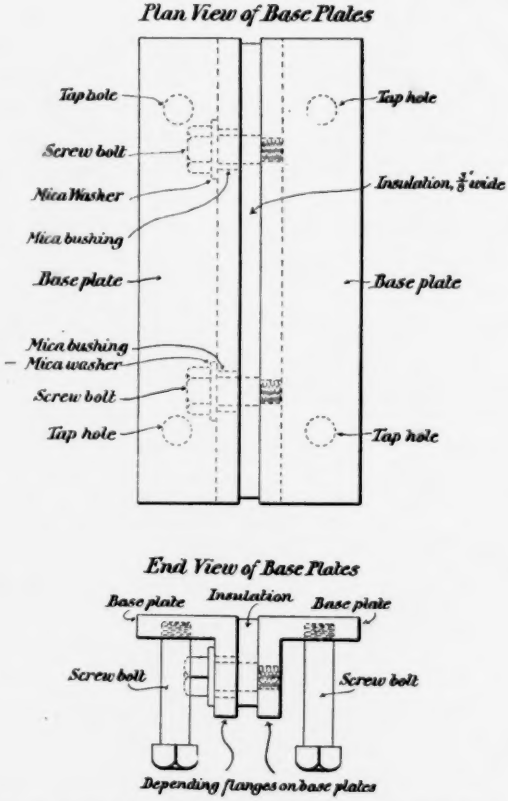
pivoted, perhaps the swinging platens themselves and one pair of handles. The insulation between the plates is new (McBerty, Vol. II, p. 817, X-Q. 379). The spot welding electrodes are new (Vol. II, p. 501, Q. 98, 99; p. 818, X-Q. 384–388). The jaws of the clamps are new (Vol. II, p. 817, X-Q. 380, 381). At least one pair of handles is new (Vol. II, p. 817, X-Q. 378). The arrangement of the device on the bench (a vital matter to the operation of welding four blades to a spider as we shall now show) is new. The transformer which supplies the welding current is not the same as it was originally (*infra*, p. 163).

In 1911 what was left of the old machine was found by McBerty in the scrap pile in the garret of the Peerless Company (successor to the Warren Company) where it had been for years. It was then bought by McBerty and by him reconstructed and remounted in its present form in 1917 (McBerty, Vol. II, p. 832, X-Q. 645; p. 838, X-Q. 748–750; p. 834, X-Q. 688; p. 855, X-Q. 951).

It will be seen that, as this machine is now set up, the greater part of it projects forwardly in front of the bench and that there is an open space between the base plates, providing ample room for the insertion of a fan spider and fan blades between the electrodes. But, as is completely established by the evidence to which we shall shortly refer, when the machine was first set up in 1901, the space between the base plates, for their full length from rear end to front end, was filled in by an insulation plate of fibre, and the machine was mounted with its front edge flush with the front edge of the bench so that no parts projected forwardly of the bench except the handles. We insert two sketches showing the details of the base plates and bolts with this insulation plate in place.

It will be obvious that when the device was set up in this manner there was no room for inserting a fan spider

between the electrodes, much less for inserting a fan spider with attached fan blades. The fact that the original 1901 mounting of this machine was as we have described it is stated by many witnesses, and it is substantially admitted by McBerty himself, who, although he says that his "notion" is that the parts projected forwardly from the bench then substantially as they do now, will not state so



Base Plates of Exhibit B as Originally Set Up.

positively (Vol. II, p. 835, X-Q. 706–710) (if he did he would be contradicted by more than half a dozen witnesses including several called by defendant). McBerty definitely admits that as the machine was originally set up in 1901, there was this insulation plate between the two parts of the device, and that because of the presence of this insulation plate there was no room for inserting a fan spider. He says (Vol. II, p. 819, X-Q. 405):—

> "There was an insulation in the center of the machine which prevented us getting our work down at the proper height."
>
> "*X-Q.* 409. And you used that [a bent electrode] because there was an insulation piece running the whole length between the bottom plates?
>
> *A.* Running the whole length, and I could not get my blade in low enough to reach it."

It is therefore definitely admitted even by McBerty himself that when the device was originally installed in 1901 its space limitations were such that it could not do the work of spot welding fan spiders to fan blades, which McBerty claims to have done on it, because there was no room into which to get the spider and four blades, and that in this respect at least Exhibit B in evidence departs from the original construction.

McBerty further says that because of this space limitation he substituted for the straight electrodes, such as are present in Exhibit B, *Z-shaped electrodes* so as to raise the points of contact between the electrodes high enough above the strip of insulation to accommodate the pieces to be welded. He says in his affidavit of 1913 (Vol. I, p. 446):—

> "I distinctly remember that at that time [*i. e.*, the early part of 1901] the space between the clamp arms 3 and 4 was not sufficiently deep to permit the sheets to be welded together to extend sufficiently low down

> when placed between the electrodes 31 and 32, when these electrodes were straight, and so we bent the ends of these electrodes upwardly so as to allow the sheets of metal to enter between the electrodes to a sufficient extent to place the weld at the spot desired."

These bent electrodes he describes as Z-shaped and he says that it was with these Z-shaped electrodes that he made his first effort "to weld fan blades to the center" (Vol. II, p. 819, X-Qs. 402–408). He admits, however, that the Z-shaped electrodes would not do the work because "we could not supply sufficient power with these Z-shaped electrodes" (X-Q. 403). Obviously they would too flexible. He says that the only kind of electrodes which he used successfully for spot welding were the straight electrodes such as are present in Exhibit B (X-Q. 391) and that in welding his fan blades he used these straight electrodes (X-Q. 403).

It is obvious, then, that until a further change had been made in the manner of mounting the machine after his admittedly unsuccessful experiments with the Z-shaped electrodes, it was impossible for McBerty to have done the work that he now claims to have done on this machine.

McBerty says that he did away with this space limitation and got the necessary room *by cutting away the forward part of the insulating piece* between the base plates. This would of course not have given him room for inserting the spider with its four arms unless he had also moved the whole device forward on the bench so that it projected beyond the edge of the bench as it does in Exhibit B.

A flat and vital issue of fact is thus raised: *Did McBerty cut away this insulating piece and change the mounting of the device so as to make it project forwardly from the bench, and if so, when did he do it?* In this connection it should

be borne in mind that his allegation is that he did this spot welding work on the fan blades and spiders in *February, 1901.* He makes no assertion that he ever did any of it after that month (X-Qs. 613, 617, 620, Vol. II, pp. 830, 831; see also Smith, X-Qs. 337, 338, Vol. I, p. 520) and his dated Exhibit M purports to have been produced on February 15, 1901.

It is vital, then, to McBerty's story that it be proved that he had cut away this insulation piece and mounted the machine so that it projected forward from the bench *at least as early as February, 1901.* So he testifies (p. 820):—

"*X-Q.* 418. Now, what time of the year did you cut away that fibre?

A. That fibre was cut away when we first welded our blades.

X-Q. 419. What time of the year was that?

A. That was in the early spring.

X-Q. 420. What do you mean by early spring?

A. In either January or February." . . .

"*X-Q.* 423. And you made these fan blades early in January?

A. Either early in January or the first of February, that is, the first part of February."

"*X-Q.* 425. How do you identify February as the month?

A. I identify February as the month on account of my first piece of work being produced, which was produced in February.

X-Q. 426. What is that, Exhibit M?

A. I don't remember the number of the exhibit.

X-Q. 427. That has stamped on it February 15, 1901, I believe?

A. Yes, sir."

But on this vital point McBerty is not only refuted by a large number of wholly unprejudiced witnesses called by the plaintiff, but also by the testimony of defendant's own witness Lipps.

Taking first the testimony of Lipps, we find that Lipps was in Cleveland and not in Warren at all, as shown by the time book produced by him, Exhibit G, until *April 29, 1901*, and that until after that date he never could have seen this McBerty machine, so that anything he testifies to about the machine must have related to dates subsequent to April 29, 1901. (See Lipps' affidavit, Vol. I, p. 451; and Lipps' testimony, Vol. II, p. 919, X-Q. 54.) Lipps testifies that when he first saw the machine(which was as we have seen *after* April 29, 1901) the insulating fibre between the two base plates *ran the whole length between them.*

We quote his testimony (Vol. II, p. 923):—

> "*X-Q.* 80. Do you recall in the original machine the fibre between the two base plates ran the whole length?
>
> *A.* Yes sir, that is why we could not get a sheet in between."

And he testified about the use of the bent or Z-shaped electrodes. He says:—

> "I distinctly remember that at that time the space between the clamp arms 3 and 4 was not sufficiently deep to permit the sheets to be welded together to extend sufficiently low down when placed between the electrodes 31 and 32 when these electrodes were straight, and so we bent the ends of these electrodes upwardly so as to allow the sheets of metal to enter between the electrodes to a sufficient extent to place

the weld at the spot desired."* (Vol. II, p. 922, X-Q. 74.)

And he further distinctly testifies, thereby rebutting McBerty's contention on the point, that the machine *did not protrude beyond the front edge of the bench.* We quote (p. 923):—

"*X-Q.* 76. Did it (the machine) stick out as far as it does now?

A. It had been altered repeatedly. When first made it set down.

X-Q. 77. Covered the whole bench?

A. Yes, sir.

X-Q. 78. Didn't stick out at all?

A. It didn't stick out at all at first."

He testified that it was *at some later time* that the machine was moved out to project beyond the bench (X-Q. 79).

This testimony of Lipps is, by itself alone, we submit,

*Note that this testimony of Lipps speaks of the welding of "*sheets of metal*", not of fan blades. Lipps admitted on the stand that he never saw any fan blades welded on the machine (Vol. II, p. 917, Q. 17) although he had asserted the contrary in his affidavit (Vol. I, p. 453). Exhibit H produced by Lipps in connection with his affidavit as a sample of the work that was done on the machine, is composed not of a fan blade and centre, but of *two portions of armature lamination discs* (Vol. II, p. 453). This Exhibit H, which was kept by Lipps as "a sample" of McBerty's work, Vol I, p. 453, is a mere "*stick*" and not a spot weld at all (Gravell, Vol. I, p. 323; Wagner, Vol. I, p. 345). It is exactly the kind of thing which might be expected to result from an attempt to weld with a current of only one volt, which was the maximum welding current that the 1901 transformer was capable of supplying (*infra*, p. 163). A "stick" is the result of a mere fusing of the oxides on the surfaces of the metal pieces, and is to be sharply distinguished from a real spot weld, in which the body of the metal itself fuses and merges (Vol. I, p. 369). Defendant makes no assertion that Exhibit H is a specimen of successful spot welding, and did not offer it in evidence. It is exactly the sort of unsuccessful experimentation which McBerty may have done in 1901 on this machine if he did anything.

sufficient to overthrow the whole McBerty story, for it definitely proves that (whereas it is vital to McBerty's story, as we have shown, to prove that the insulation fibre had been cut away and the machine mounted so as to project beyond the bench as early as February, 1901) this defendant's witness, who could not possibly have seen the machine until after April 29, 1901, distinctly remembers that when he first saw it the insulation fibre had not been cut away, that the machine did not project beyond the bench and that in the experiments which he saw, it was necessary to use the impractical expedient of the Z-shaped electrodes in order to get any pieces of metal into the machine.

But this is not all. McBerty *never* cut away the insulation fibre or mounted the machine so that it projected forward of the bench (both of which steps were necessary to make room for his doing the work on the fans which he says he did) at least until long after 1901, if the testimony of at least five unbiased witnesses familiar with the machine is to be believed.

L. C. Brewer, called by plaintiff, is the chief witness on this point. His deposition is to be found at Vol. I, pp. 269–284. He was the first and only regular operator on this machine, and he worked on it for about four years, doing butt welding on the fan guards for the Warren Company (p. 270, Qs. 13–18). He therefore, if anyone, ought to know whether or not this machine was mounted as McBerty says, with the forward end projecting beyond the bench as in Exhibit B, and whether there was any slot in the insulation or in the bench to provide room for welding fan centres to fan blades. He definitely testifies that the machine was mounted on a solid fibre plate, that there was no slot in it while he worked on the machine, and that *no part of the machine except the handles projected beyond the bench*. We quote his testimony (Vol. I. p. 272):

"*Q.* 24. You have referred to a piece of fibre under the clamps. How big was the fibre in its area?

A. About 8 x 10, as I remember it.

Q. 25. Were there any slits in this piece of fibre?

A. Not while I worked on this machine."

"*Q.* 27. Did the clamps extend beyond the edge of the bench?

A. Yes, the length of the handles. Did you mean the clamps that clamp the ring?

Q. 28. Yes.

A. They did not. Not to my knowledge.

Q. 29. To make this matter exactly clear, what parts of the device did extend beyond the edge of the bench?

A. The handles of the machine.

Q. 30. Do you recall the work of putting this electric welding device on your bench?

A. Yes, sir.

Q. 31. State whether or not the bench was cut with a slit for this machine.

A. It was not."

Brewer made a sketch of the machine as it was when he worked upon it which is in evidence as Plaintiff's Exhibit 32 (Vol. I, p. 462), which shows no part of the machine projecting beyond the bench except the handles and no slot in the bench between the two halves of the machine.

Brewer knows of no spot welding being done on this machine, and knows of no other method of fastening the blades on the fan spiders by the Warren Company than riveting (p. 274, Qs. 51, 52).

C. R. Brewer, called by plaintiff, was employed by the Warren Company in the fan department during the years 1901, 1902 and 1903 and saw the machine every day (Vol. I, p. 285, Qs. 14–16). He likewise testifies that the

machine as then used was mounted upon an insulated fibre plate (Q. 17, Vol. I, p. 285), that the bench and fibre plate were not slotted (Q. 18), and that the machine did not protrude beyond the bench (Q. 20, p. 286). *He never knew fan blades to be attached otherwise than by riveting and never knew of any spot welding being done on this machine* (Q. 24, p. 286; Qs. 30, 31, p. 287).

C. G. Wolfe, called by plaintiff, aided McBerty in building this machine (Qs. 8, 9, Vol. I, pp. 309, 310), and worked at the Warren Company's factory until 1902 (Qs. 5, 6). He testifies to the same effect, namely, that the machine was set on fibre "flush or nearly flush with the bench" (Qs. 13, 14, p. 310). *He knows of no spot welding having been done on the machine* (Q. 18, p. 311).

L. L. Little, called by plaintiff, was one of the men who made the mechanical parts of the machine (Q. 10, Vol. I, p. 311). He testifies to the same effect, to wit, that there was no slot cut in the bench (Q. 15), and that "there was no space to put anything there at all, unless itwas a very narrow piece" (Q. 16). All fan blades were riveted to the spiders (Q. 23, p. 312), *and Little never heard of any other welding being done on it except butt welding* (Qs. 17, 18, p. 312).

G. I. Spade, called by plaintiff, at the period in question was in charge of the motor assembling department for the Warren Company (Qs. 12, 13, Vol. I, p. 314) and frequently saw the machine in operation (Qs. 15, 16, p. 282). He testifies to the same effect as the other witnesses, to wit, that the machine as he knew it was mounted upon a fibre plate (Q. 18), and that it was not possible to insert blades or steel pieces between the welding electrodes "unless it would have been a very narrow piece, say about one-half inch" deep (Qs. 20, 21, p. 315). He testifies that the photograph of the present machine shows the machine projecting too far from the bench to represent

correctly the original mounting (Q. 18). *He never heard of any spot welding being done on the machine* (Qs. 24, 25, p. 315).

These witnesses do not remember that the base plates were angle irons (L. C. Brewer, Q. 41, C. R. Brewer, Q. 21, Wolfe, Q. 13, Little, Q. 14, and Spade, Q. 12). This is strong corroboration of their testimony that the device was set into a fibre base plate and did not protrude beyond the edge of the bench, because in that case the depending flanges of the angle irons would be imbedded in the fibre base and be concealed by it and by the fibre strip between them. These witnesses had no reason to take the machine apart as would be necessary in order for them to see the depending flanges of the angle irons.

Moreover, *defendant's* witnesses corroborate the clear and explicit testimony of these five men, to the effect that the machine is set up differently now from what it was originally, in that originally it did not project over the front of the bench as it does now. Thus Lipps says that it has been "altered repeatedly" and "*didn't stick out at all first*" (X-Qs. 76, 78, Vol. II, p. 923).

Defendant's witness Smith makes a similar admission at X-Q. 218, Vol. I, p. 510, saying that "the clamping device did not extend so far out past the edge of the bench at the Warren Electric & Specialty Company as it now does, as it is mounted".

Defendant's witness Craft admits that the machine as originally set up had fibre between the base plate and the bench (X-Q. 98, Vol. II, p. 781) and is unable to say that the machine projected over the bench (X-Q. 213, p. 789).

There was no reason why the device *should* project beyond the edge of the bench for butt welding the fan guard rings, for no part of the rings extended below the clamps in this operation. To have so arranged it would have made it weak because it would have been held in

place only by the rear bolts. It would also have been in the way of the workmen passing back and forth in front of the bench.

McBerty admits that when he found the device in the garret of the Peerless Company (successor to the Warren Company) in 1911 it was mounted on a slate base which "ran all the way under the plates" so that there was no room for the insertion of a fan blade (Vol. II, pp. 832, 833, X-Qs. 660–670).

Numerous other changes would have had to be made in this machine by McBerty besides cutting away the insulation fibre and moving the machine forward, in order to adapt it to do the work of spot welding fan blades to spiders. For example, the horizontal distance between the two base plates would have had to be increased from the 3/8 inch which it was originally (McBerty, Vol. II, p. 828, X-Qs. 566–568) to the 3/4 inch or so which intervenes between the two plates as the machine stands now (McBerty, X-Q. 569, p. 828), in order to make room laterally between the base plates to accommodate the fan blades and spiders. This would have necessarily involved:

(1) Cutting a new groove in the support or table into which the depending flange of one of the base plates was to be set;

(2) Putting in a new and wider piece of insulation fibre between the base plates at their rear;

(3) Relocating the vertical screw bolts attaching one of the base plates to the bench;

(4) Readjusting the horizontal bolt which holds together the rear ends of the base plates; and

(5) Removing altogether the forward horizontal screw bolt holding the two plates together, because with this bolt in place there would be no room for a fan spider with attached blades.

All this involves, as will be seen, a very considerable amount of work and readjustment, and it is incredible that if these changes had been made, such a man as L. C. Brewer, the first and only regular operator on the machine for four years, would not have known about them.

It is, therefore, clear:

(1) That the 1901 butt welding machine as originally built and set up could not possibly have been used for spot welding fan blades to spiders, because of the space limitations on the machine; and this is admitted even by McBerty. Exhibit B is *not* the machine as it originally was installed in 1901, but it is a mere 1917 reconstruction, with many new parts, and mounted in a vitally different manner. The pretence that its present mounting and arrangement is a counterpart of the 1901 mounting and arrangement depends purely upon oral testimony, and the inconclusive oral testimony of McBerty alone at that, which oral testimony is refuted by many witnesses.

(2) That the changes necessary to be made on this machine to make it possible for it to accommodate fan spiders and fan blades to be spot welded, were certainly not made until after April 29, 1901, is clear from the testimony of defendant's witness Lipps, whose date is established by the record evidence of his time book; whereas the contention of McBerty and his witnesses, on which this whole defence is predicated, is that complete fan blades and spiders were successfully welded on the machine in February, 1901. No witness claims that any practical use was made of the process after the "trayful of fans" alleged to have been made in February, 1901, were completed.

(3) That unless the unsupported word of McBerty alone is to be believed as against the testimony of half a dozen unprejudiced witnesses, he *never* made the changes in the machine necessary to adapt it to accommodate a fan spider with attached blades, *at least until years after*

1901; and, as we believe, not until after he got the machine from the garret of the Peerless Company in 1911 and reconstructed it in 1917 to use as an exhibit in support of his prior use contention.

We therefore contend with the utmost confidence that it is positively proved that McBerty's story of spot welding fan blades and spiders in 1901 on this machine *cannot be true, because of the space limitations that there then were in that machine.*

McBERTY COULD NOT HAVE DONE SPOT WELDING WHEN HE SAYS HE DID IT IN 1901 BECAUSE HIS TRANSFORMER WOULD NOT GIVE SUFFICIENT CURRENT.

We shall now show that it was impossible for McBerty to have done any real spot welding at all on his machine at the time in 1901 when he testified that he did it, for the reason that *the transformer which was used with it at that time would not provide sufficient current to accomplish spot welding* when connected up with a 250 volt primary circuit which was the only one available (Vol. II, p. 780, X-Q. 83).

This transformer, as shown by the transformer book of the Warren Company, was one which had been sent to Freehold, N. J., and had been returned to the Warren Company and delivered to its fan department on January 20, 1901 (McCurdy, Vol. I, p. 689; McBerty's letter, Vol. II, p. 945.)

This transformer record book produced by defendant's witness McCurdy contains what purports to be a complete record of the characteristics of the transformer in 1901. The record shows that there was *only one turn on the secondary* and the least number of available turns in the primary was 222 (Vol. I, p. 688). With a primary current of 250 volts pressure, which was alone used at the Warren Company plant (Vol. II, p. 780, X-Q. 83), there-

fore a maximum pressure in the secondary circuit of only 1.1 volts could be produced (Gravell, Vol. I, p. 355),* *which voltage is too small to do any successful spot welding, although it was sufficient to do the butt welding of the guard rings for which it was designed* (p. 357). This is a positive electrical fact testified to by Mr. Gravell. *It is in no way contradicted by defendant.*

It should be noted that the voltage used by defendant in its spot welding demonstration on Exhibit B at the Ford plant was 4½ volts (Vol. II, p. 827, X-Q. 557).

In fact, with the transformer as it was originally the current was hardly sufficient even for butt welding. Little (Vol. I, p. 312, Q. 20), and Wolfe (p. 310, Q. 17), state that at first many of the butt-welded rings came apart at the welded joint.

The transformer was, therefore, changed, but not until after April 29, 1901, months after McBerty testifies that he did his spot welding and after spot welding had been entirely abandoned according to the testimony of both McBerty (Vol. II, pp. 830, 831) and Smith (Vol. I, p. 520). Defendant's witness Lipps expressly says in his affidavit, taken in 1913 with McBerty's knowledge and co-operation, that he "*recalls distinctly*" seeing McBerty change the device "*by putting in a transformer of larger capacity so that sufficient current could be supplied*", which change was made at some time after April 29, 1901, a date fixed by Lipps by his time book as that on which he returned to Warren from Cleveland (Vol. I, pp. 451, 452). He also so testified on the witness stand (Vol. II, p. 922, X-Q. 65). Defendant's witness Craft emphatically denies

*The secondary voltage bears to the primary voltage the same ratio that the number of turns in the secondary bears to the number of turns in the primary. So that with a given primary voltage and a given number of turns in the secondary, the less turns in the primary the higher the voltage in the secondary.

that the transformer now in the machine is the one which had been to Freehold (Vol. II, p. 779, X-Q. 70).*

McBERTY COULD NOT HAVE WELDED THE G-TYPE FAN SPIDERS TO FAN BLADES BECAUSE THOSE SPIDERS WERE BRASS — NOT STEEL.

We come now to the third of the three propositions which we have advanced as a positive demonstration that McBerty's story cannot be true.

McBerty's story is that for the season of 1901 the Warren Company was about to manufacture a new and cheap type of fan, known as the G-type fan which had sheet steel spiders and steel fan blades and that he spot welded these parts together for a dozen or fifteen of these G-type fans. His Exhibit M has in it a piece of such a sheet steel spider. If, however, it is not true that the spiders for the G-type fans were of steel in 1901 — if they were of brass, then the story necessarily breaks down, because it is impossible to weld brass to steel and of course McBerty does not claim ever to have done so (Vol. II, p. 1016). Were, then, the spiders for the G-type fans in 1901 of sheet steel, or of brass?

McBerty admits that in 1900 the Warren Company had only brass spiders, and no steel spiders (Vol. II, p. 713, Q. 21, p. 1019), and there is no contention that McBerty or the Warren Company ever had any steel spiders prior to

*The transformer book gives the secondary voltages as 2, 2½, 3, 3½ and 4. This is inconsistent with the fact that there was only one turn in the secondary provided the primary current is 250 volts (Gravell, Vol. I, p. 355). The book has been in McBerty's possession for some time (McCurdy, Vol. I, p. 688). The voltage figures might have been filled in at any time. *The "1" in the column which gives the number of turns in the secondary stands unchallenged as establishing its original condition.* This "1" could not have been altered or erased without some tell-tale mark, but figures like the voltages could be *added* in a blank space.

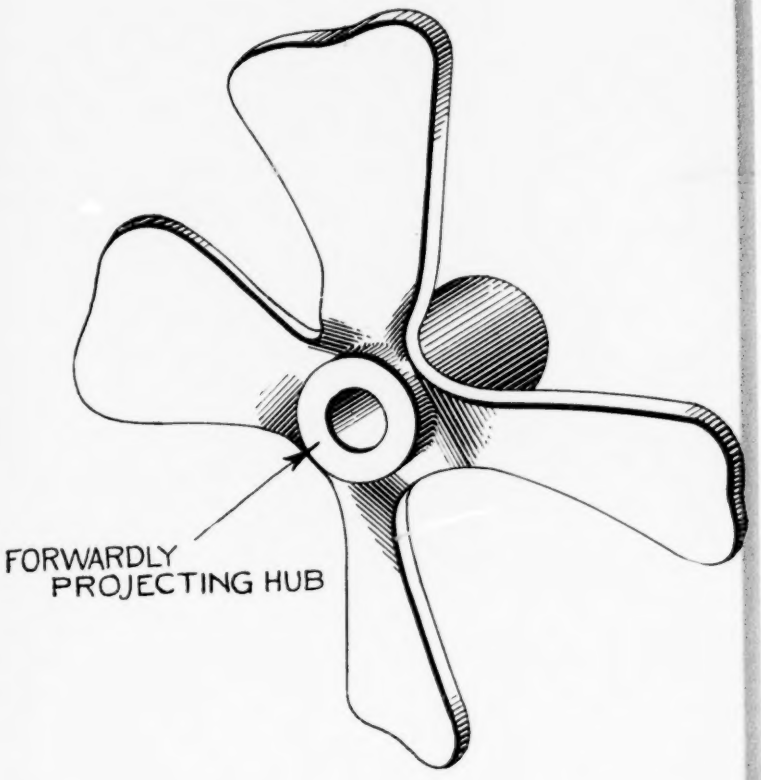
The secondary voltages obtained are not a characteristic of the transformer but they depend on the voltage of the primary current.

1901. McBerty says, however, that in the new G-type fans produced during that year (on a "trayful" of blades and spiders of which he claims to have done this spot welding), the spiders were made of rolled steel, *i. e.*, sheet steel (Vol. II, p. 726, Q. 102).

In considering the evidence on this matter, the Court should first have in mind the difference in appearance and construction between the brass spiders which the Warren Company had always used before and the sheet steel spiders such as McBerty untruly claims were used in 1901 on the G-type fans.

In a *brass spider*, the hub and projecting arms (to which the blades are to be attached) are all integral parts of one casting. The shape of such a cast brass spider is illustrated in the sketch on the opposite page, and it will be seen exemplified in Plaintiff's Exhibit No. 51, a fan identified by Mr. Binder as the Warren Company's 1901 G-type fan (Vol. I, p. 386). It is identical with the illustrations of these G-type fans at page 17 of "Defendant's Exhibit No. 2, Warren Electric Specialty Company's 1901 Catalogue" offered (Vol. I, p. 499). Note particularly that a portion of this hub projects forward of the point from which the arms extend.

The *steel spiders*, on the other hand, such as McBerty claims to have used, are made up of two non-integral parts joined together, — first, the spider proper, which is stamped out of sheet metal, and second, a cylindrical steel hub upon which the spider proper is mounted. The construction of these parts is explained by McBerty at Vol. II, p. 723, and we illustrate it by a sketch opposite page 167, Figures 1 to 4. It will be seen that the steel hub is provided with "a small projection or collar" over which the spider is fitted, the back of the spider resting against the shoulder on the hub and the collar projecting slightly through the hole in the spider. The spider is



CAST BRASS SPIDER.

SHEET STEEL SPIDER AND HUB.



Fig. 1.

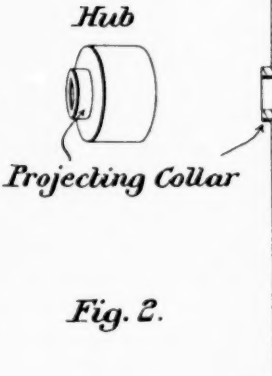


Fig. 2.

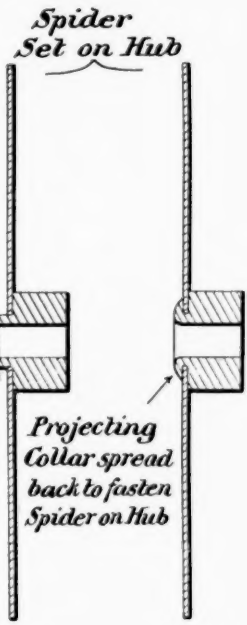


Fig. 3. Fig. 4.

then attached to the hub by upsetting this projecting collar, as shown in Fig. 4.

It is upon sheet metal spiders of this construction that McBerty says he spot welded his fan blades in 1901 (Vol. II, p. 1019). Such spiders are shown in the cut at page 589 of the Electrical World for March 4, *1909* (Plaintiff's Exhibit 64), showing the "Peerless Fans" (Gravell. Vol. I, p. 362) then made by the Peerless Company the successor of the Warren Company, and in the cuts of the Peerless Company fans in the *1910* Peerless catalogue (Plaintiff's Exhibit 68, see pages 4–7).

McBerty says that these sheet steel spiders were used in the G-type fans in 1901 (Vol. II, p. 726, Q. 102; p. 1019).

But if the Court will now look at the illustrations of these G-type fans at page 17 of the Warren Company's 1901 catalogue, it will see that these illustrations contradict him. Both show *a regular cast brass spider* like all the other fans shown in the catalogue.

Confronted by this fact (and he admits that at least the cut of the G-1 fan on this page 17 does show the cast brass spider, Vol. II, p. 972, RDQ. 2), McBerty attempts to avoid the difficulty by explaining that *this cut does not show the standard construction of this fan* (RDQ. 2, p. 972), an explanation that, to say the least, obviously requires strong corroboration.

Now it appears (Vol. II, p. 760) that the defendant has had in its possession (or at least that it has had access to) a considerable number of these G-type fans of 1901. But defendant *produced none of these fans in support of McBerty's assertion that the catalogue illustration did not show the standard construction of the fan*, and this fact alone is, we submit, enough to discredit his testimony on the point. If the cut was wrong, an actual specimen of the fan would easily correct the error, but no such correcting specimen is produced. *On the contrary the specimen of this type of*

1901 *G-1 fan which the plaintiff located and produced as Plaintiff's Exhibit 51* (Vol. I, p. 385) *has this regular cast brass spider just as is shown in the catalogue.*

McBerty's contention, therefore, that the G-type fans were made in 1901 with sheet steel spiders, is refuted by the record evidence of the catalogue — and also by the only actual specimen of that fan in evidence — Plaintiff's Exhibit 51.

But this is not all.

McBerty's statement is also definitely refuted by the testimony of the witness Binder, who was employed by Vallee Brothers of Philadelphia, sales agents for the Warren Company's fans during the year 1901 and later (Vol. I, pp. 384, 385), and who is therefore thoroughly familiar with the Warren Company's output, and who says of that company's 1901 fans (Vol. I, p. 386, Q. 16):

> "At that time I can say *the universal construction was to make the spider on which the blades were mounted of castings*, and that was subject to breakage, a certain chance of breaking the spiders. *In later years* that was changed to make these spiders of stamped metal.
>
> "*Q.* 17. Does what you have just said apply to the Peerless fans?
>
> *A.* Peerless fans and other fans also."

Not only, then, is McBerty's story that in 1901 the spiders of the G-type fans were made of sheet steel, and not of cast brass, contradicted by the record evidence furnished by the catalogues and by a sample of the fan itself, but it is definitely contradicted by the witness Binder, whose business it was at the time to know the construction of these fans, and to sell them.

The story is, moreover, extremely improbable when one considers the fact that the very purpose for which this G-type fan was gotten up was to produce a fan which

would be *less expensive* to manufacture than the others, and could be sold cheaper; whereas the change from a cast spider to a sheet steel spider would inevitably have caused a large increase of cost. Such a change would have required much new apparatus and new and expensive hand operations. By way of new apparatus, there would necessarily have been required, 1st, a die to stamp out the spiders; 2d, a die to punch the central hole in the spider and the rivet holes in its arms; 3d, mechanism for forming a steel hub and cutting a collar on it; 4th, an upsetting die for upsetting the projecting end of the hub over the spider to fasten it in place.

This would have involved also new manufacturing operations as follows: — 1st, the work of stamping out a spider; 2d, the work of punching the central hole in the spider; 3d, the lathe work necessary to shape the hub and cut away the collar on it, an extremely expensive operation unless special automatic machinery involving heavy expense was procured; 4th, upsetting the end of the hub of the spider so as to fasten the two parts together.

That the Warren Company should have substituted a sheet steel spider, involving all these operations and apparatus, for a simple cast metal part, in a new fan which they were getting out with the one object of *reducing cost* when they were making no such change in the rest of their output, would be so absurd that the story that it was done would be unbelievable, even if it were not definitely contradicted definitely in so many other ways.

The story is inconsistent with the excuse that McBerty gives for the abandonment of the alleged spot welding process, namely, that it would require the purchase of an additional welding machine, jigs, etc., which would have involved "added equipment" (Vol. II, p. 946) and "further expenditure" (Vol. II, p. 869).

Later on, in 1909 or thereabout, the Peerless Company,

successor o the Warren Company, adopted the sheet, metal spider on all its fans, and the McBerty Exhibit M, spuriously dated 1901, is doubtless composed of one of these spiders of 1909, or later, attached to a fan blade.

We submit, therefore, that the proposition advanced by McBerty that the G-type fans upon which his alleged work was done in 1901 had sheet steel spiders (a proposition absolutely necessary to his story) is positively disproved.

THE "CORROBORATING EVIDENCE" PRODUCED BY DEFENDANT TO SUPPORT McBERTY'S STORY ON ANALYSIS WHOLLY FAILS TO CORROBORATE IT.

The evidence produced by defendant to corroborate McBerty's story told in this case may be summarized under three heads: *first*, and foremost, the cut of the G-2 fan in the Warren Company's 1901 catalogue, which defendant alleges shows a fan with spot welded blades and spider, one of the "trayful", made by McBerty in 1901; *second*, the physical exhibits produced as contemporaneous specimens of McBerty's 1901 work, notably Exhibit M; and *third*, the oral testimony of other witnesses called to corroborate McBerty.

We shall take up these several points in order and show the Court that none of the three gives any support to McBerty's present story.

THE CUT OF THE G-2 FAN IN THE WARREN COMPANY'S 1901 CATALOGUE.

On page 17 of the Warren Company's 1901 catalogue (Defendant's Exhibit No. 2) appear two cuts, showing respectively the G-1 and the G-2 fans.

The defendant triumphantly points to the cut of the G-2 fan, saying that it does not show any rivet heads, and therefore claims that here is record evidence in support of

McBerty's contention as to the trayful of spot welded fan blades and spiders made in the year 1901.

Upon this cut, which was not referred to in the story told in 1913, to Mr. Howe or to McBerty's counsel, McGill, is largely built the defendant's case. As we shall see later, in collecting evidence for the defendant in this case this cut was shown by McBerty and by defendant's agent, Smith, to the witnesses who have testified for the defendant, with the assertion that it proved the spot welding contention; it has been used as a means of "refreshing" the memory of these witnesses, practically all of whom, as we shall later see, remembered nothing of the kind in 1913.

We point out in the first place that there is a discrepancy in the testimony of McBerty himself on this point, for he said in his answer to Q. 92, Vol. II, p. 724 (just before the catalogue was handed to him for identification by his counsel), that the alleged 1901 spot welding was done *"on the small fan,"* that is to say, on the 12-inch or G-1 fan shown at the left of the two cuts in the catalogue, as distinguished from the larger 16-inch G-2 fan shown at the right. *But rivet heads can be clearly seen on this small G-1 fan*, as McBerty admitted in his answer to Q. 95, page 725, so that the *small* or G-1 fan was certainly not spot welded as McBerty first testified. The witness Craft, whose recollection was "refreshed" by conversations with McBerty (p. 795, RXQ. 263), also stated that it was the small or G-1 fan that was spot welded (Vol. II, p. 792, X-Qs. 244–247).

It is not necessary, however, to enlarge upon this discrepancy, for there are more fundamental and absolutely unanswerable reasons why this cut fails to support the McBerty story.

The Catalogue is Proved by Defendant's Own Witnesses to Have Been Published at a Time Before McBerty Claims to Have Done or Could Have Done any Spot Welding.

It will be remembered that McBerty claims to have done his spot welding on these fan blades and spiders only in *February, 1901*, and says that this Exhibit M, which has stamped on it the date *February 15, 1901, was his first piece of work* (X-Qs. 425–429, Vol. II, p. 820.) We quote:

"*X-Q.* 425. How do you identify February as the month?

A. I identify February as the month on account of my first piece of work being produced, which was produced in February. . . .

X-Q. 427. That has stamped on it February 15, 1901, I believe?

A. Yes, sir.

X-Q. 428. Had you made any complete four-bladed fan blades at that time?

A. I think not. Otherwise it would not have been stamped as my first production along those lines.

X-Q. 429. Had you made any before that?

A. No."

Indeed, the butt welding machine on which McBerty claims to have done the spot welding was not put into use until after January 20, 1901, for it was on that date that the transformer was first turned over to the fan department of the Warren Company (Vol. I, p. 689).

These alleged spot welded G-2 fans, then, were certainly not made until after February 15, 1901. But defendant's witness Sawyer, who was called by defendant to identify this catalogue, says that it was **"undoubtedly published and printed in 1900, along in December, probably"**

(Vol. I, p. 682), that is to say, **some two months before McBerty on his own testimony ever spot welded a fan spider and blades.**

Mr. Estabrook, defendant's witness who produced his catalogue, explained that the fan season — that is, the period when the contracts for the sales of the fans are made — is January, February and March, and that the catalogues are gotten out *in preparation for that selling season* (Vol. I, p. 676). McBerty himself confirms this, saying (Q. 109, Vol. II, p. 728):

> "We issued one catalogue per year, and this was brought out sufficiently early to get in the hands of the jobbers *before the fan season started.*"

February, he says, was "late in the season" (Vol. II, p. 856, X-Q. 963).

In fact, the advertisement of the Warren Company in the Electrical Review for *November 21, 1900*, Plaintiff's Exhibit 53, page 12, indicates that the catalogue was ready or about to be ready as early as this date, November 21, 1900, for it says:

> "Peerless incandescent lamps, fan motors, transformers are made on honor, no disappointments when used, *send for catalogue*, prices right."

Such an invitation would hardly have been issued unless there were catalogues ready to be sent to inquirers.

It is therefore established by defendant's own witnesses, including McBerty himself, that this catalogue was issued at least as early as December, 1900, long before any spot welding could possibly have been done or is claimed to have been done by McBerty.

Defendant's witness Roberts (Vol. I, p. 693) produces a ledger entry dated March 19, 1901, of the R. W. Roberts Company which published some of the Warren Company's

catalogues, which entry he says was probably for the printing of this catalogue. This entry was not made, he says, *until after the last shipment of the issue was made*, and as the deliveries might well have been made piecemeal, this proves nothing as to the date when the catalogue was printed (p. 695). Indeed Roberts' testimony strongly corroborates that of the other witnesses, for it is obvious that there would not have been time between February 15 and March 19 for the experiments to be concluded, jigs made to hold the blades and spiders during welding, a complete fan to be assembled, japanned and photographed, a cut made from the photograph, and the work of printing and binding 3,000 to 5,000 catalogues (p. 693) done.

The evidence above stated as to the date of publication of this catalogue, which is obviously enough to demolish McBerty's pretensions as to the significance of the cut, stands, then, absolutely uncontradicted, and it comes from defendant's own witnesses.

The Catalogue Cut Shows a Riveted and Not a Rivetless Fan.

Even if the cut did not show rivet heads on the faces of the blades, no inference could be drawn that there were no rivets in the actual G-2 fan. Mr. Turner, a professional photographer, explains (Vol. I, p. 306) the manner in which such a cut is made. The original negative is treated with an "air brush" which may eliminate such details as rivet heads, and then the negative is retouched before the cut is made. In the retouching process an unimportant detail like a rivet head may or may not be restored by the photographer. This is illustrated by comparison of an original photograph of a riveted fan made by Mr. Turner (P. Ex. 34, Vol. I, p. 485) with a cut made from that photograph treated with an "air-brush" in the usual manner (P. Ex. 37, Vol. I, p. 487). The photograph clearly shows the rivets, but the cut shows none.

An examination of the other cuts in this catalogue of 1901 shows that rivet heads are sometimes not shown on admittedly riveted fans. See, for example, the cuts of the blades of the E-2, E-3 and G-1 fans in this 1901 catalogue, in some of which some of the rivet heads are lacking while in others they are shown. It may depend largely on the amount of light thrown on the fan blade. Thus in the cut of the G-1 (p. 17) fan three of the blades are comparatively unlighted and no rivets are seen, but in the portion of the fourth blade exposed to direct light they stand out clearly. No part of the blades in the G-2 cut appears to be exposed to a direct light.

McBerty explains the failure of the rivets to appear on some of fan blades in certain of these cuts by saying that the rivet "does not always show in the figure, depending upon the way the light strikes the fan blade" (Vol. II, p. 872, X-Q. 1205), an explanation which is entirely sufficient to account for the absence of any appearance of rivets on the faces of the fan blades in the G-2 cut.

Conclusive evidence that the absence of a showing of rivet heads on the faces of the blades is no proof that the blades were spot welded is furnished by the fact that the 1903 catalogue of the Colonial Fan Company, the selling agent of the Peerless Company (Sawyer, Vol. II, p. 1009), *shows two cuts of fans in neither of which are there shown any rivet heads on the blades* (McBerty, Vol. II, p. 1019). There is no suggestion or pretense that any 1903 fans were spot welded. On the contrary both McBerty (pp. 830, 831) and Smith (Vol. I, p. 520) state positively that no spot welding was done after 1901.

Some of the Warren Company's fan blades were countersunk so that the rivet head was flush with the front surface of the blade, the rivet projecting only behind the spider (Brewer, Vol. I, p. 287, Q. 32); and here again is a

reason why the rivets, when the blades were covered with a coat of japan, might not show in a photograph, or be noticed by a casual observer.

The mere fact, therefore, that a cut of a fan shows no rivet heads on the blades is not proof by any means that such blades were spot welded.

But as a matter of fact, while no rivet heads are to be seen on the *faces* of the blades in the cut of the G-2 fan on page 17 of the 1901 catalogue, *a rivet head does indistinctly appear upon the rear side of the downwardly extending blade* (Wagner, Vol. I, p. 344; Gravell, Vol. I, p. 322), as careful examination of the cut will show. Although McBerty was called twice in sur-rebuttal he did not venture to deny the testimony of plaintiff's witnesses to this effect.

In working up the McBerty story for the purposes of this case photographs of this misleading cut were taken about by the defendant's investigator and witness, Mr. W. E. Smith, by McBerty, who interviewed the other witnesses, and by defendant's counsel,* and they, with 1917 photographs of the welder, Exhibit B, in the process of spot welding a fan blade to a spider, were undoubtedly used to convince witnesses, whose own personal recollection was lacking, that fans with spot welded blades were manufactured by the Warren Company in 1901.

But the fact is that the catalogue illustration could not possibly show a spot welded fan sold by the Warren Company, because it was printed and published at a time before any spot welding could possibly have been done or is claimed to have been done by McBerty and that *the catalogue illustration does not show a rivetless fan at all.*

*Such photographs are in evidence in Plaintiff's Exhibits No. 38 and No. 39, which were shown by W. E. Smith to L. C. Brewer, the regular operator of the machine from 1901-1904, in an unsuccessful effort to persuade Brewer to remember spot welding (Vol. I p. 275).

THE EXHIBITS IN EVIDENCE PURPORTING TO BE SPECIMENS OF McBERTY'S 1901 WORK.

Exhibit H.

The only specimen purporting to represent McBerty's 1901 work in the case, which is identified by any other witness than McBerty himself, is Exhibit H attached to Lipps' affidavit of 1913, put in evidence by plaintiff. As proved by Lipps' time book, his first acquaintance with McBerty's work was after April 29, 1901 (Vol. I, p. 451). This exhibit H consists of a pair of halves of thin steel armature lamination discs stuck together. Lipps states in his affidavit that it has been in his possession ever since it was made in 1901, and that he saved it "*as a kind of a sample*" of McBerty's 1901 experiments (Vol. I, p. 453).

This exhibit may be authentic, *but it is not spot welding.* It is what is known as a "stick" (Gravell, Vol. I, p. 323; Wagner, p. 345), and is exactly what would result from an attempt to weld with a current of only about one volt, which was the maximum pressure of the welding circuit that the 1901 transformer was capable of supplying. A "stick" results from the mere fusing of the oxides on the surfaces of the metal pieces and is to be sharply distinguished from a real spot weld, in which the metal in the body of the metal pieces fuses and merges (Vol. I, p. 369). No one would assert that Exhibit H is a specimen of real spot welding. *But Exhibit H represents the nearest approach to spot welding that could have been done on the machine equipped with the transformer which McBerty had in 1901 when supplied with the primary current of 250 volts used by the Warren Company.*

Exhibit H is a piece of most convincing evidence against McBerty's claims. Lipps naturally would have preserved as good a sample of McBerty's experimentation as there was, if he preserved any at all. That he

produced nothing better than this useless "stick" is most persuasive proof that McBerty produced no real spot-welds.

Defendant's counsel very significantly failed to ask Lipps anything about Exhibit H, and it was reserved for the plaintiff to put it in evidence along with Lipps' affidavit.

McBerty's Newly Produced Specimen, Defendant's Exhibit M, is Spurious.

We have previously pointed out that Mr. Edwards, counsel for the defendant in the Barney & Berry case, after examining the affidavits and evidence collected by Mr. Howe in 1913 and after talking with McBerty, concluded that it was useless to rely upon the alleged McBerty prior use, as well because it was not proved as because at best it amounted only to an abandoned experiment. There was *no record evidence* in support of the story, such as is necessary in order to comply with the established principles of law regarding the proof of prior use.

We have above shown that in the effort to avoid the criticism of "abandoned experiment" McBerty has now enlarged his story by telling about a trayful of fan blades and spiders which he asserts he spot welded and which he says went into the commercial output; and we have shown that that addition to his story is untrue.

We now shall deal with the second new addition to the McBerty story, which he has for the first time brought forward in this case and by which he hopes to supply the element of contemporaneous dated evidence, previously lacking. That is his Exhibit M, which he now produces as a specimen of his work done in February, 1901, and contemporaneously dated. It consists of a piece of spider made of sheet steel, spot welded to a fragment of a steel

fan blade which is nickel plated. The exhibit is stamped with the date "2–15–01" and with McBerty's name.

McBerty's statement as to this exhibit is absolutely uncorroborated. The exhibit is not identified by any other witness in this case.

The exhibit was certainly very new in appearance for an article made 18 years before it was introduced in evidence and kept loosely in a tool box ever since, and the marking on it might have been done yesterday. The exhibit is, we confidently submit, of recent origin, and McBerty's testimony regarding it is not the truth.

In the first place, the spider is of steel, whereas as we have shown in a previous section (p. 165), there were no steel spiders available to McBerty in 1901, but only in subsequent years. They are shown first in the Peerless advertising matter in 1909.

In the second place, the blade is copper-and-nickel plated (Vol. I, p. 346, Q. 16); but the G-1 and G-2 fans were the only ones made by the Warren Company in 1901 with blades not made of brass (Vol. II, p. 712), and the blades of the G-1 and G-2 fans *were finished in plain black enamel.* This is definitely proved by the description of these fans on page 17 of the 1901 Warren Company Catalogue, Defendant's Exhibit 2 containing the cuts upon which defendant places so much reliance. This catalogue description reads as follows:

> "Types G-1 and G-2 are rigid iron-clad fans of symmetrical design and strong mechanical construction. *The finish throughout is plain black enamel.*"

The fact that the 1901 steel fan blades were finished in black enamel is corroborated by defendant's witness Craft (X-Q. 229, Vol. II, p. 790), and by the sample of this 1901 G type of fan (Plaintiff's Exhibit No. 51) which we located and produced in evidence by the witness Binder

(Vol. I, p. 385); nor is it denied by McBerty or any other witness.

The truth is that in 1901 there were no nickel-plated steel blades.

In 1902 a change was made in the finish of the blades for the G-1 and G-2 fans, and in that year they were nickel plated. The legend at the foot of the cuts of these fans shown in the Peerless Company's 1902 catalogue (Defendant's Exhibit I) at page 11, shows this, and McBerty admits that this change was made in 1902 (p. 728, Qs. 113, 114). He testifies as to this change (Q. 114, p. 728):

> "Instead of supplying a black japan finish over the entire fan, they have changed the finish from black japan to nickel plate as far as the guards and the blades are concerned."

It was not until at least 1902, then, that any nickel-plated fan blades were available to McBerty.

Careful inspection of this Exhibit M furthermore, shows the marks of rivet heads about the rivet holes (Gravell, Vol. I, p. 324, Q. 22; Wagner, p. 346). This means that the blade had at some time been riveted and that the rivets were taken out and the blade spot welded to the spider arm. All the circumstances indicate that McBerty made this exhibit at some comparatively recent time by removing the rivets from an old fan blade and spot welding the blade to a modern sheet steel spider arm. But when he did it *he forgot that there were no such nickel-plated fan blades in 1901.*

Equally convincing evidence that Exhibit M is spurious is the fact that McBerty, who says that he found this exhibit in his tool box in 1911 (*supra*, p. 146) never showed it either to his attorney, Mr. McGill, who made a thorough investigation of the subject-matter in the early part of

1913, or to Mr. Howe, who, in the latter part of 1913, spent two weeks with him in investigating the story, getting affidavits of numerous witnesses, including McBerty himself, and collecting evidence for use in the Barney & Berry case. It was just this kind of dated evidence that these attorneys were looking for. Mr. Howe particularly testifies how keenly alive he was to the necessity of having some such evidence (*supra*, p. 144).

McBerty's letter to his attorney, Mr. McGill, of January 2, 1913 (dated January 2, 1912, by mistake), said (Vol. II, p. 945):—

> "I have also samples of spot welding which was done on the welder at the time we did this experimenting, and while *we are unable to identify the exact date* we can approximate it within two or three months."

McBerty's statement to Mr. McGill that he had no means of identifying the exact date of his experimenting is utterly inconsistent with his possession at that time of this dated specimen. McBerty's statement that he deliberately held the specimen back from Mr. Howe (Vol. II, p. 843, X-Q. 841) is wholly incredible in view of the weeks of time and effort that he put into collecting evidence for Mr. Howe and of what McBerty had at stake.

It is putting the matter mildly indeed to say that Exhibit M is not proved by that degree of evidence which is requisite for prior use testimony.

We go so far as to say that in all probability this McBerty Exhibit M was fabricated after April, 1918, when McBerty's corroborating witness, William E. Smith, testified. It is only reasonable to suppose that had this Exhibit M been in existence at the time of Smith's testimony, he would have known about it and testified concerning it. Smith's silence as to this exhibit in his testi-

mony of April, 1918, strongly indicates its non-existence at that time.

Other Specimens of McBerty's Alleged 1901 Work.

In connection with the affidavits which were obtained by Mr. Howe in 1913 from McBerty, Lipps and Brown, there were produced four physical exhibits, namely, Exhibits O and P attached to McBerty's affidavit, Exhibit H attached to Lipps' affidavit, and Exhibit B attached to Brown's affidavit. These exhibits — the only ones in the case except Exhibit M — further discredit McBerty's story of 1901 spot welding.

Exhibit H we have already mentioned. It is produced and identified by Lipps as having been in his possession since some date in 1901 after April 29.

It is a mere "stick" such as might well have been made with the machine and transformer as it was in 1901. It is in no sense an example of successful spot welding, and no one asserts that it is.

Exhibit B, attached to Brown's affidavit, was not produced as a 1901 sample, for Brown in his affidavit merely said that it was like what he saw in 1901 (Vol. I, p. 481). McBerty's affidavit says nothing about this sample, and its origin is wholly unexplained. No reference is made to it in the testimony in this case.

Exhibit O and Exhibit P are two specimens produced by McBerty in connection with his affidavit of 1913. McBerty there alleged that these were made in 1901. *He makes no such assertion in his present testimony* for the good reason that they could not have been made in 1901.

Defendant did not even offer these exhibits in evidence in this case. McBerty was not questioned about them except in connection with his cross-examination. They were put in evidence by plaintiff together with the McBerty 1913 affidavit.

Each of these two exhibits is made from a piece of a steel spider and a piece of fan blade. But there were no steel spiders available to McBerty in 1901 (*supra*, p. 165). The fan blade of Exhibit O is made of steel which is copper plated and oxidized (Wagner, Vol. I, p. 345), and that of Exhibit P is made of steel which is copper and nickel plated. But there were no fan blades of steel which were copper plated and oxidized or copper and nickel plated available to McBerty in 1901; *the only steel blades which the Warren Company had in that year were finished in black enamel*, as we have pointed out above, p. 179.*

*Exhibit P is closely related in origin, evidently, to Defendant's Exhibit M, upon which McBerty now places such reliance. It will be remembered that Exhibit M is the specimen produced by him in this case for the first time, bearing the date stamped on it "2-15-01" and McBerty's name, this being the sample which now turns up for the first time and which he never showed or mentioned either to Mr. Howe or to his own attorney, Mr. McGill and to which he did not refer in his affidavit of 1913. The piece of a spider included in Exhibit P was evidently cut off from the piece of spider included in Defendant's Exhibit M, since the two parts fit together.

McBerty asserted on the stand that when he put the story up to his attorney, Mr. McGill, early in 1913, he cut the sample of his work which he then had in two, keeping one part of it and giving Mr. McGill the other part, and that this other part which he gave to Mr. McGill was what he showed Mr. Fish at his interview in 1913 (Q. 179, Vol. II, p. 738; Q. 182, p. 739; pp. 267, 268); and he says Exhibit M is the part which he retained and which never left his possession (Q. 150, Vol. II, p. 733; Q. 154, p. 735; Q. 254, p. 753). Apparently this Exhibit P is what McBerty had in mind in this testimony, for the sample which he gave Mr. McGill and which was turned over to Mr. Edwards was annexed to his affidavit prepared by Mr. Howe (Edwards, Q. 10, Vol. I, p. 291; Q. 11, p. 292). At all events these samples annexed to the affidavits are the only ones which we know anything about. McBerty's story is very much mixed, for the Exhibit P, while its spider part was evidently cut from the spider part of Exhibit M, does not match up with Exhibit M in the way in which McBerty said that it should.

McBerty admits that Exhibit P was not made at the same time as Exhibit M and not until long after, because he says that the piece which has been cut from the fan blade of Exhibit M and which he says appears in Exhibit" P was not cut off from Exhibit M until "quite a long while" after the fan blade of Exhibit M was welded to the spider (Q. 258, Vol. II, p. 754).

The blade of Exhibit O has been welded to the piece of spider arm *after* the spider arm was cut off from the rest of the spider, as shown by the blueing or heat marks on the cut surface of the spider arm caused by its oxidizing in the air when the blade was heated in welding (Gravell, Vol. I, p. 323, Q. 15, 16).

Concentric marks around the two rivet holes in the blade of this exhibit show that it was once riveted (Gravell, Q. 17).

The cut end of the spider arm of Exhibit P shows the same blueing as in the case of Exhibit O, and indicates that this exhibit also was welded *after* the spider arm was cut (Gravell, Q. 19).

The indentations on the backs of the welds of Exhibits O and P are perpendicular to the surface. If they had been made on blades attached to a spider the indentations would have been slightly oblique because the spider with blades attached would have to be put into the machine at a slight angle, as was demonstrated in the operation of the machine at the Ford plant (Gravell, Q. 27–29).

The evidence afforded by these exhibits themselves shows, therefore, that they could not have been welded in 1901 because neither blades so finished nor sheet steel spiders were available in that year.

The heat marks of the welding that appear on the surface of the cuts show that the spider arms were cut before the blades were welded to them. This completely refutes McBerty's assertion that he welded these blades to a spider which was afterwards cut into pieces.

That these exhibits were probably welded some time after 1909 is shown by the fact that no such sheet steel spiders were in existence at the Peerless plant before that year.

These two exhibits P and O are not vouched for by any witness whatever in the present case; even McBerty appears to rely upon them no longer, for, as we have said,

they were not mentioned by him except in connection with his cross-examination.

The upshot of the whole situation, then, so far as the exhibit specimens are concerned, is that there is no single exhibit purporting to have been made in 1901 which is identified by anyone but McBerty himself except Exhibit H, the "stick" produced by Lipps which is not spot welded at all; that McBerty no longer relies upon or testifies about any exhibit other than Exhibit M, the dated specimen which turns up for the first time in this case, and that Exhibit M, like the other specimens except Exhibit H, bears on its face evidence that it could not have been made in 1901.

THE "CORROBORATING" WITNESSES.

We have shown that there is nothing whatever in the nature of *record evidence* to support McBerty's story — none of the "*concrete, visible contemporaneous proofs which speak for themselves*" which experienced courts require to support a prior use contention (*Emerson & Norris Company* v. *Simpson Bros.*, 202 Fed. 747, C.C.A. First).

The machine, *Exhibit B*, we have shown, *supra* p. 150, to be nothing but a mere recent reconstruction embodying certain parts only of the old 1901 butt-welding machine, and mounted in a vitally different manner from that in which the 1901 butt-welding machine was mounted; and its alleged similarity to the 1901 machine depends absolutely upon oral testimony, and at that upon the oral testimony of McBerty alone, contradicted by some half dozen thoroughly reputable and disinterested witnesses, called by the plaintiff as well as by a number of witnesses of the defendant.

No *specimen of a fan having spot welded blades*, such as McBerty claims that the Warren Company sold, to the number of a dozen or fifteen, is produced, although defendant says that it has spent much money and effort in the

attempt to locate such a specimen. It is likely that if there ever had been a dozen such fans made it would be possible to produce at least one, as a result of all this search.*

The *catalogue cut* of the G-2 fan which is so much relied upon in support of McBerty's contention is shown to be no support at all, for the catalogue is proved by defendant's own witnesses to have been published months before McBerty claims to have done his work, and even before the machine on which he claims to have done the work was installed; and, moreover, it does not show a rivetless, but a riveted, fan.

There is nothing in the nature of a *contemporaneous specimen of McBerty's alleged 1901 spot welding work in evidence that is identified by any other witness than McBerty himself, except Exhibit H*, produced by Lipps, which he could not have seen made till after April 29, 1901, and

*Defendant has found numerous fans of the G type in question (Vol. II, p. 760), but has nof produced one of them. We ourselves have located and put in evidence one such fan (P. Ex. 51; Vol. I, p. 382). *None of these had spot welded blades.*

No such spot welded fan has been produced — for the reason that *no spot welded fan ever existed.*

The story by defendant's witness, Ensor, that he saw a fan with rivetless blades in the junk room of the Peerless Company in 1911 is merely uncorroborated memory and of course a fan which appeared for the first time in 1911 is utterly of no consequence. It was in the Peerless junk room that McBerty in the same year, 1911, found parts of his old welder and transformer (Vol. II, p. 832). If there had been in that room in 1911 a fan with blades spot welded by him in 1901, it is impossible that he should not have found it and kept it as pretended proof of his alleged 1901 spot welding.

Defendant's witness, McDonald, who remained with the company for years, asserts particularly that no spot welded fan ever came back and therefore none could have been in the stock room, where returned fans were kept (Vol. II, p. 882, Q. 63).

McBerty also made a thorough search for a spot welded fan or such a "fan blade independent of the motor" in the plant of the Peerless Company in 1913 (Vol. II, p. 961, Q. 7), but he did not find any such thing.

therefore contradicts McBerty's story of successful spot welding in February, 1901. This exhibit is a mere "stick", not a true spot weld at all, and not pretended to be such by the defendant. By itself it goes very far to prove that McBerty's experiments in 1901 did not produce successful spot welding, for otherwise Lipps would have preserved a sample of such welding instead of this unsuccessful "stick". Exhibit M, the dated specimen now produced by McBerty, but identified by no other witness, is clearly shown to be spurious, — manufactured as we believe for the purposes of this case, and at any rate a recent construction.

There were, however, a number of witnesses called by the defendant who, speaking purely from memory nearly eighteen years after the event, and after having their memories artificially "refreshed" by being shown the misleading catalogue cut of the G-2 fan, the reconstructed and changed Exhibit B, and alleged samples of spot welding done on it, purport to give testimony in corroboration of some parts of McBerty's story.

McBerty himself is clearly discredited as a witness, That circumstance goes far towards overthrowing the entire prior use story. He is the mainstay of the defense. the central prop of the entire fabric. In all the cases of a discredited attempt to defeat a patent by an alleged prior use, the courts have recognized that if the story of the man whose work is relied upon is false, the testimony of those who are merely called to corroborate him is subject to suspicion. The courts know how easy it is to excite in such corroborating witnesses a recollection of facts that, never existed, particularly if they are skillfully approached with such significant refreshers of their memories as the cut in the 1901 catalogue and the reconstructed machine Exhibit B. In many such cases the controlling circumstance has been the breaking down of the story of the

main witness. If his testimony is shown to be false or ineffective, the rest of the case should in almost every instance fall with it. In many cases distrust of the main witness has largely contributed to disbelief in the whole story.

In the *Telephone Cases* (126 U.S. 1) not one only but several men, after Bell's patent came out, claimed that they had made the invention years before. Drawbaugh was one of these alleged prior users, and he supported his claims by *not less than two hundred witnesses* who swore in court that they were familiar with his telephone many years before Bell's invention was made. The court, however, recognized that it was simply impossible that anyone could have achieved Bell's result so many years before and have done no more about it than Drawbaugh did. The court said (p. 567):—

> "We do not doubt that Drawbaugh may have conceived the idea that speech could be transmitted to a distance by means of electricity, and that he was experimenting on that subject, *but to hold that he had discovered the art of doing it before Bell did would be to construe testimony without regard to 'the ordinary laws that govern human conduct.'* "

In another of the telephone cases, namely, *American Bell Telephone Co.* v. *American Cushman Telephone Co.*, 35 Fed. 734, another prior use was urged and supported by the testimony of a number of witnesses whose honesty the court (Judge Blodgett) did not question. The court, however, concluded that Cushman's imagination had been made morbidly active by seeing the fame and success of Bell, and that he had "clothed what he did in those past years with a light reflected from the success of others, and his statements of what he did then have unconsciously

colored the testimony of many of those he has called to support him".

In the Edison Incandescent Lamp cases, after the patent had been sustained in a hard-fought litigation, the patentee was confronted with an alleged prior use of one Goebel, whose story was corroborated by *not less than 40 witnesses.* Here again, as in the case at bar, the facts relating to the alleged prior use had been investigated by the defendant in the first case, and the defense found insufficient. It was rejected as inherently improbable in *Edison Electric Light Co.* v. *Beacon Vacuum Pump etc. Co.*, 54 Fed. 678, 692, Circuit Court District of Mass., and in *Electric Mfg. Co.* v. *Edison Electric Light Co.*, 61 Fed. 834, C. C. A. 7th Circuit.

In the case at bar there is not only the same inherent improbability of successful prior use as in the *Telephone* and the *Incandescent Lamp* cases, but there are proved by competent evidence, mainly supplied by defendant's own witnesses, a number of facts which convert that improbability into an impossibility. These facts not only contradict McBerty in every important circumstance relating to his alleged prior use of spot welding in 1901, but also explain how the witnesses called to corroborate McBerty were misled by him and by his fabricated evidence, including apparently authentic but really false and misleading photographs of his welding machine the deceptive and misleading cut of the G-2 fan in the 1901 catalog, and of its supposed 1901 spot welding product, and samples of spot welding alleged by him to have been made in 1901 but now proved to have been made of blades and spiders which did not exist in that year.

While we cannot believe it to be necessary, we will briefly analyze this memory evidence—given *eighteen years* after the event—upon which defendant must rely, to substantiate McBerty's story.

The alleged corroborating witnesses, who testify for defendant in this case, are Craft, Powers, Gilder, McDonald, Lipps and Smith.

Powers and Lipps.

As to the witnesses Powers and Lipps, there is nothing whatever in their testimony inconsistent with our proposition that what McBerty did was an abandoned experiment. Both of these men say that what McBerty did was purely experimental. "They were not going through the commercial part of it"; "Just experimental" (Lipps, Vol. II, p. 923, X-Qs. 83–85).

Powers says that "all of the spot welding that I can recall was experimental" and he never saw any complete fan blades and spiders spot welded by McBerty (Vol. II, Q. 35, p. 875; Q. 39, p. 876). The exhibit produced by Lipps, "Exhibit H", as a sample of the work that McBerty did in 1901, even assuming that it is authentic, is nothing but a mere "stick". It is not spot welded at all, and is just the kind of work that might have been done with a transformer of the small capacity which McBerty's transformer had in 1901 which could not supply adequate current to make a spot weld.

Craft, McDonald and Gilder.

Each of these witnesses was interviewed in 1913 by Mr. Howe, in company with McBerty, and *each and every one of them at that time, which was six years nearer the date of the circumstances as to which they were testifying, had little or no recollection of the alleged spot welding about which they now glibly testify.*

Craft, when interviewed in 1913 by Mr. Howe and asked for his recollection regarding the matter, said that he did not recollect the matter very much and refused to give a affidavit (Howe, Vol. I, p. 304, Qs. 16–18). Craft himself admits that

"I told him I was hazy about this spot welding, and **I didn't feel as I remembered it then that I could possibly state about the spot welding end of it." . .**

"I had forgotten the whole circumstances for several years, of course." (RX-Qs. 262–264, Vol. II, p. 795.)

Craft even now admits that he *never saw any spot welding* (Vol. II, X-Q. 87, p. 780); he merely says that he *was told by McBerty* that some fans that were shown to him were "spot welded".

McDonald likewise was interviewed by Howe in 1913 and "did not seem to have much recollection in regard to the early welding" (Howe, Vol. I, p. 301), although McBerty and Howe "used every effort to stimulate his recollection by suggesting things" (Howe, Vol. I, p. 378, Q. 7). At that time, as McDonald admits, he **"didn't recall distinctly"** the things to which he now testifies (McDonald, Vol. II, X-Q. 78, p. 883). An affidavit was drawn up by Howe for McDonald's signature, which affidavit was forwarded by him to McBerty but never sworn to. *That affidavit McBerty never delivered to Mr. Howe, and it has been suppressed: at least McBerty does not now produce it* (Howe, Vol. I, Qs. 8, 9, p. 379; McBerty, Vol. II, X-Q. 11, p. 971).

Gilder also made an affidavit for Mr. Howe in 1913, in which affidavit (see Plaintiff's Exhibit 29, Vol. I, p. 449) he said:

"The only kind of welding which I remember seeing done on the machine at that time was the welding together of the ends of the stock to make the fan guard rings. [This was butt welding.] It was only occasionally, however, that I was in a position to know what kind of work was being done on the machine, so that other kinds of work and

characters of welds may have been made which I knew nothing about."

Now, under the stimulus of the effective coaching of Smith, McBerty and others, Gilder says that he remembers seeing some fan blades, which had been electrically welded on this machine, in a tray (Vol. II, p. 904). But *he did not see the process.* He did not know of his own knowledge how the blades and spiders were put together.

Such testimony as that of Craft, McDonald and Gilder, in view of their complete lack of knowledge of the subject-matter six years before the date of their testimony (and six years nearer to the time when it all was supposed to have happened), ought, we submit, to carry no weight at all.

Smith.

The other witness, Smith, is the man who was hired by the "Welding Patents Investigating Committee" in 1917 to line up witnesses and work up the evidence regarding this McBerty alleged prior use. Although Smith was living in Warren in 1913 when McBerty spent two weeks of his time taking Mr. Howe around to see all possible witnesses who could be found to support his story, McBerty never thought it worth while to take Howe to see Smith (Vol. II, p. 860, X-Q. 1046; Vol. I, p. 514, X-Qs. 262–265). He thought of Smith as a "transformer man" (p. 863, X-Q. 1100) and evidently did not expect him to know anything about the welding work.

Smith's memory has now been "refreshed" by the cut of the G-2 fan in the 1901 catalogue of the Warren Company (RDQs. 380-382, Vol. I, pp. 523, 524), which has been used to "refresh" the memory of the other witnesses and to make them believe that it represents spot welded fan blades when in fact it shows nothing of the kind.

Smith, now in his paid enthusiasm to support McBerty's story, goes a little too far, for he says that he saw E. C.

Lipps using the machine for welding the blades to the spiders of fans (X-Q. 331, Vol. I, p. 520), and he says explicitly that it was in the latter part of January or in February of 1901 that he saw him doing this, and in no other months of that year and at no other time (X-Qs. 336–338). But Lipps never went to the Warren Company factory after the welding machine was installed until after he left his job at Cleveland on April 29, 1901 (see his affidavit, Vol. I, p. 451). He does not recollect even that he ever saw the process of welding the fan blades (Q. 17, Vol. II, p. 917), much less did he ever carry on that process himself.

Many Witnesses, Familiar with the 1901 Butt Welding Machine, Never Heard of its Being Used for Spot Welding.

As against this contradictory and artificially "refreshed" recollection testimony we have the unequivocal testimony of many witnesses, employees of the Warren Company at the period in question, to the effect that they never knew of this machine being used for anything but butt welding. This is the testimony of L. C. Brewer, the regular operator on the machine from the time it was put in and for four years thereafter (Vol. I, p. 270, Qs. 15, 16; p. 274 Q. 52); of C. R. Brewer, who was employed in the fan department at the time and saw the machine every day (Vol. I, p. 285, Qs. 14–16; p. 286, Q. 24); of C. J. Wolfe, who helped make the welding machine and whose job it was to assemble the fan motors (Vol. I, pp. 309, 310, Qs. 8–11; p. 311, Q. 18); of George I. Spade, who was an assembler in the fan department and frequently saw the machine (Vol. I, p. 314, Qs. 12–16; p. 315, Qs. 24, 25); and of L. L. Little, who assisted in making the machine and getting it going (Vol. I, p. 311, Qs. 8–10; p. 280, Qs. 17–19). There are also the affidavits to the same effect obtained by Mr. Howe

with McBerty's knowledge and assistance, of the following: Robert J. Meenely, whose work was to make the fan guards that were welded on this machine (Vol. I, pp. 465, 466); Walter T. Wakefield, who was in charge of the japanning department which japanned these fans (Vol. I, pp. 468, 469); David R. Estabrook, now superintendent of the Peerless Company (Vol. I, pp. 469, 470); Robert W. Bean, the machinist who assisted in making the copper jaws for this welding machine (Vol. I, pp. 470, 471); Alfred C. Ulp, who sometimes assisted in butt welding on the machine (Vol. I, p. 474); and Alton J. Lewis, a machinist then and ever since in the employ of the Warren Company and its successors (Vol. I, pp. 476, 477).

None of these affiants ever saw or knew about spot welding in the factory of the Warren Company, certainly not in 1901, although they were employed there and some of them at least would have known of the matter if there were any real foundation for McBerty's story

No One Claims to Have Actually Seen McBerty Weld the "Trayful" of Fan Blades and Spiders.

Even Smith, who was hired by the Welding Patents Investigating Committee to work up this McBerty defense, carefully avoids stating that he saw McBerty actually welding four blades to a spider. He says he saw at least a dozen, perhaps more, "completed fans" "so welded" (Vol. II, p. 496, Q. 47). Completed fans are those which were ready for the market and therefore had been japanned or black enameled. The black enameling on the faces of the blade would conceal the heads of countersunk rivets, which might have been employed to give a smooth finish to the faces of the blades.

Craft did not see McBerty do any spot welding (Vol. II, p. 780, X-Q. 87). He only saw the front of the blades

after they were japanned (p. 790 X-Q. 228–229). So that if the rivet heads were countersunk and then japanned he would not have seen the rivets (X-Q. 230–232). It is merely an "inference" on his part that the fans were spot welded (X-Q. 233).

Powers, who "installed a piece of fiber insulation the full length of the machine which is different from the one now in place" (Vol. II, p. 874, Q. 18), only saw what he calls "experimental work" on transformer iron and fan blade stock (Q. 35–38). He did not "see any complete fan blades with the spiders" (Q. 39).

McDonald (whose testimony, as we have shown, is completely discredited by his non-recollection when seen by Howe and McBerty in 1913; *supra*, p. 191), now, after evident coaching by McBerty, states that he saw McBerty weld four blades to *one* spider (Vol. II, p. 881, Q. 37–39). No one else ever claims to have seen as much as that.

Gilder never saw anyone do any spot welding on the machine (Vol. II, p. 904, Q. 40).

Lipps doesn't recollect of seeing the fan blades themselves welded (Vol. II, p. 917, Q. 17).

Bettiker (Vol. II, p. 978) does not state that he saw any spot welding done.

The essential part of McBerty's story, therefore, namely, the fact that he spot welded a dozen or fifteen fan spiders to their blades, and that these spot welded structures went into complete fans that were sold, lacks even nominal corroboration from any witness.

Nevertheless some of these witnesses, — whose honesty we have no desire to question, — do claim to have seen in 1901 one or more fans with spot welded spiders and blades which McBerty told them he had produced. Their testimony cannot be true, for as we have shown above, it was, for a number of irrefutable reasons, impossible for McBerty to have spot welded these structures in 1901

when he says he did. How, then, is this testimony to be explained? We respectfully submit that there is no burden upon us to explain this matter; the failure of the McBerty defense is clear; but we venture to suggest a possible explanation.

The Possible Actual Facts in the Matter.

There is no doubt that McBerty set up in the Warren Company factory early in 1901 a welding machine having some of the parts of the machine in evidence as Exhibit B, and that this machine was subsequently used for the purpose of butt welding the ends of the fan guard rings for the new G type fans. The machine was not, however, in its present condition. As we have shown above, it had no space for welding a fan spider and blades, and the maximum potential which the transformer would deliver was only one volt, which was insufficient to do spot welding, and hardly sufficient for butt welding.

McBerty may have done some experimenting with this machine. Craft testifies:—

> "We did do almost all sorts of experimenting on that machine. We tried most everything." (X-Q. 184, Vol. II, p. 787.)

And it is possible that in the course of that experimenting McBerty tried to see what would happen if he interposed two thin sheets of steel between the ends of two copper wires placed in the clamps of the machine. It is not worth while for us to question the authenticity of Lipp's Exhibit H (the only exhibit in the case purporting to represent McBerty's 1901 work which is vouched for by anyone except McBerty himself). This Exhibit H is a mere "stick" showing on its face that sufficient current was not used to do real spot welding. Exhibit H is made of a pair of pieces of armature laminations, but it may even

be that McBerty also tried the operation with similar results on pieces of fan blades lying above the plant. *That was all that he did or could have done in any way relating to spot welding on this machine.* Even this much is not proved. Such experimenting which McBerty may have done may furnish the ground-work upon which the testimony of the other witnesses is based, and from which, by skilful coaching, has been developed, after 18 years lapse of time, the present greatly enlarged story. There is nothing surprising about this growth of the story. It is because of their recognition of the fact that such stories do grow in this way, that the courts have laid down the salutary rule requiring that an anticipation of this sort should be proved "beyond a reasonable doubt" and that something more than memory evidence is necessary to prove such an alleged prior use (authorities, *infra*, p. 200).

We have seen that no witness claims actually to have seen McBerty spot weld the blades to the spiders of his trayful of fan blades and spiders. But a few of them do claim to have seen completed fans that had been spot welded. This erroneous impression on the part of these witnesses, if it has any basis whatever, may well have been due to the fact that in some of the Warren Company's fans the heads of the rivets were *countersunk* in order to provide a flat surface for the japanning in which case the rivet heads would not show. Thus Brewer testifies (Vol. I, p. 287, Q. 32) that in some of the fans at some time "the blades were countersunk and a flush rivet was inserted and the head was riveted on the back of the spider". When the blades of these fans were japanned, as they were in the G type fans, they would look as spot welded blades now look, because no rivet heads were to be seen.

The Testimony of Defendant's Witnesses was Falsely "Refreshed" by Showing them the Misleading Catalogue Cut and the Reconstructed Exhibit B.

The testimony of the defendant's witnesses shows very clearly how their recollections were falsely stimulated by the misleading interpretation of the cut of the G-2 fan in the 1901 catalogue of the Warren Company, used by Mr. McBerty to embellish his story of spot welding.

McBerty apparently had sufficient recollection of the 1913 affidavits collected by himself and Howe to know that Lipps and Brown, the men on whom he relied in 1913 to corroborate his statements, had stated in their affidavits that there was never any actual practical or commercial use of McBerty's 1901 spot welding and he therefore ignored them and sought first his friend, William E. Smith, whose affidavit had not been taken by Mr. Howe, although Smith was living in Warren in 1913, when Howe was there and was readily available to give an affidavit had he known anything about the 1901 alleged spot welding.

Armed with the photograph, superficially authentic, of the G-2 alleged spot-welded fan in the 1901 catalogue, and with the welding device of Exhibit B rearranged so as to protrude sufficiently from the edge of the bench to permit the insertion of a fan spider and four blades, and connected to a modern transformer capable of providing a current adequate for spot welding, McBerty in 1917 could easily make a demonstration to Smith of spot welding of the kind which he desired Smith to remember as having been done in 1901. Smith could be induced to swallow the story, hook, bait and sinker, since his own recollection of the actual facts had been dimmed by the lapse of sixteen years, and since it was to his interest, as the paid investigator for the Welding Patents Investigating Committee,

to remember the facts as McBerty told them. Smith then set out to hunt up witnesses and to persuade them also of the truth of the story. He, of course, took with him the same cut of the G-2 supposedly rivetless fan, and photographs of the McBerty remodeled machine with fan blades and spiders in welding position (such as he showed L. C. Brewer; see Plaintiff's Exhibits 38 and 39, offered Vol. I, p. 308), and undoubtedly also showed the witnesses samples of complete fan blades and spiders which he represented, on McBerty's say-so, to be exactly like the work said to have been done in 1901.

It is therefore not surprising that out of the many ordinary workmen who were employed by the Warren Electric & Specialty Company in 1901, and who saw the machine butt welding, and perhaps used, as Craft says, in experimenting in other ways (possibly even in an attempt to "stick" with electrodes), there could be found some whose recollections were sufficiently obliterated by time so as to be capable of receiving a fresh impression from the plausible story of McBerty and Smith, backed by plausibly presented photographs of an alleged actual spot welded fan, and who would therefore adopt the story told by McBerty and Smith.

When such men had once been persuaded to accept McBerty's story of actual practical spot welding for commercial fans in 1901, all the rest of the details followed as a matter of course and the minds of these witnesses naturally imported into the supposed operations of 1901 their knowledge of spot welding which had been acquired in later years.

The Court will notice, when it reads the testimony of the defendant's witnesses, how unduly cognizant they are of the eighteen year old "facts" concerning which they had been coached and concerning which their recollection had been refreshed by McBerty's false story and misleading

catalogue, photographs and specimens, but how very inaccurate and deficient were their recollections about any other facts on which they had not been thus coached and refreshed. For example, Craft testified that he gave McBerty an affidavit in 1913, when it was in fact in 1917 (X-Q. 121, Vol. II, p. 782; X-Q. 261, p. 794), and he could not recollect "whether it was before or after the war" that he talked with Mr. Pattison (X-Q. 107, p. 781).

The fact of the matter is that the testimony of the witnesses other than McBerty is based merely on McBerty's story and on his worked up evidence and his misleading photographs and exhibits.

The substance of this McBerty prior use defense is now built on the supposed showing of the cut of the G-2 fan in the 1901 catalogue of the Warren Electric & Specialty Company first discovered in 1917.

With the sweeping away of this basis for the McBerty defense goes its entire substance.

PRIOR USE MUST BE PROVED BEYOND A REASONABLE DOUBT BY CONTEMPORANEOUS CONCRETE EVIDENCE.

The law of prior use and the attitude of the courts toward attempts to invalidate a meritorious patent by such testimony as is set before the court by the defendant in this case is presented completely and conclusively in the recent case of *Eibel Co.* v. *Paper Co.*, 261 U. S. 45, in which this Court rejected as "incredible" (p. 60) the testimony of alleged prior uses. This Court said (p. 60):—

> "It is true that some witnesses testify that they realized before Eibel's application that speeding up the stock to equal velocity with the wire would solve the difficulty and aid the speed. But there is not a single written record, letter or specification of prior date to Eibel's application that discloses any such discovery by anyone, or the use of the pitch of the

wire to aid the speed of the machine. The oral evidence on this point falls far short of being enough to overcome the presumption of novelty from the granting of the patent. The temptation to remember in such cases and the ease with which honest witnesses can convince themselves after many years of having had a conception at the basis of a valuable patent, are well known in this branch of law, and have properly led to a rule that evidence to prove prior discovery must be clear and satisfactory. *Barbed Wire Patent Case*, 143 U. S. 275, 284; *Loom Co.* v. *Higgins*, 105 U. S. 580, 591."

In the *Barbed Wire Case* there were a number of prior uses set up, the principal one of which was the exhibition of a panel of a barbed wire fence at a county fair by one Morley. Some twenty-four witnesses were produced on behalf of the defendant who testified to the existence of this fence. The court held that the prior use had not been sufficiently proved, saying:—

"We have now to deal with certain unpatented devices claimed to be complete anticipations of this patent, the existence and use of which are proved only by oral testimony. *In view of the unsatisfactory character of such testimony, arising from the forgetfulness, of witnesses, their liability to mistakes, their proneness to recollect things as the party calling them would have them recollect them, aside from the temptation to actual perjury, courts have not only imposed upon defendants the burden of proving such devices, but of declaring that the proof shall be clear, satisfactory and beyond a reasonable doubt. Witnesses whose memories are prodded by the eagerness of interested parties to elicit testimony favorable to themselves, are not usually to be depended upon for accurate information.* The very fact which

courts, as well as the public, have not failed to recognize that almost every important patent, from the cotton-gin of Whitney to the one under consideration, has been attacked by the testimony of witnesses who imagined they had made similar discoveries long before the patentee had claimed to have invented his device, has tended to throw a certain amount of discredit upon all that class of evidence, and to demand that it be subjected to the closest scrutiny. Indeed, the frequency with which testimony is tortured or fabricated outright to build up a defence of the prior use of the thing patented, goes far to justify the popular impression that the inventor may be treated as the lawful prey of the infringer. The doctrine was laid down by this Court in *Coffin* v. *Ogden* (18 Wall. 120), that 'the burden of proof rests upon him', — the defendant, — 'and every reasonable doubt should be resolved against him. If the thing were embryotic or inchoate; if it rested in speculation or experiment; if the process pursued for its development had failed to reach the point of consummation, it cannot avail to defeat a patent founded upon a discovery or invention which was completed, while in the other case there was only progress, however near that progress may have approximated to the end in view'. . . . Fourth: *If any experiments were made by Morley in this direction, they were evidently looked upon by him and by the public as of no practical value, and were subsequently abandoned and the fences lost.* . . . There was, evidently, prior to Glidden's application more or less experimenting in a rude way in and about Delaware County upon the subject of barbed wire as applied to wire fences. . . . *It is possible that some one of these experimenters may have, in crude way, hit upon the exact device patented by*

Glidden, although we are not satisfied from this testimony whether or by whom it was done."

"It is quite evident, too, that all, or nearly all, of these experiments were subsequently abandoned."

In *Deering* v. *Winona Harvester Company*, 155 U. S. 286, the testimony was that a certain pivoted extension for a grain binder, which was produced as an exhibit, was used to cut part of 250 acres and was subsequently abandoned for other reasons than any defect in the device. The use was testified to in considerable detail by the alleged prior user, and there were other witnesses. The court held that the proof was not sufficient, saying (p. 300):—

"As we have had occasion before to observe, *oral testimony, unsupported by patents or exhibits, tending to show prior use of a device regularly patented is, in the nature of the case, open to grave suspicion. The Barbed Wire Patent*, 143 U. S. 275. Granting the witnesses to be of the highest character, and never so conscientious in their desire to tell only the truth, the possibility of their being mistaken as to the exact device used, which, though bearing a general resemblance to the one patented, may differ from it in the very particular which makes it patentable, are such as to render oral testimony peculiarly untrustworthy; particularly so if the testimony be taken after the lapse of years from the time the alleged anticipating device was used. If there be added to this a personal bias, or an incentive to color the testimony in the interest of the party calling the witness, to say nothing of downright perjury, its value is, of course, still more seriously impaired. This case is an apt illustration of the wisdom of the rule requiring such anticipations to be proven by evidence so cogent as to leave no reasonable doubt in the mind of the court, that the transac-

> tion occurred substantially as stated. . . . If he ever used a pivoted device at all — of which we have considerable doubt — *his efforts in that direction must be relegated to the class of unsuccessful and abandoned experiments which, as we have repeatedly held, do not affect the validity of a subsequent patent. Corn Planter Patent*, 23 Wall. 181, 211. *Coffin* v. *Ogden*, 18 Wall. 120, 124."

In *Emerson & Norris Co.* v. *Simpson Bros. Corporation*, 202 Fed. Rep. 747 (C. C. A. 1st), the defendant sought to prove prior use by a number of very respectable witnesses whose evidence was supported by letters and a diary. The evidence was sufficiently strong to persuade the lower court that the prior use had been proved beyond a reasonable doubt. The upper court, however, considered that it was not sufficient, saying (p. 749):—

> "This case (*Brooks* v. *Sacks*, 81 Fed. 403), however, developed the underlying rule that ordinarily, in cases like the present, *it is necessary that the anticipations should be supported, not merely by the testimony of one or numerous witnesses relating to matters many years previous, but by concrete, visible, contemporaneous proofs which speak for themselves.* . . .
>
> "*The result of all these cases is that*, with reference to questions of the class which we have here, namely, the identity of structure as between what is patented and what is alleged to have anticipated it, *something more than oral testimony, even of the highest character, is required where there has been a considerable lapse of time.*"

The attitude of the courts towards such evidence as that of McBerty and his witnesses has been stated many times. In *Wood* v. *Cleveland Rolling Mill Company*, 4 Fish.

P. C. pp. 550, 559, the court (Swayne and Sherman, JJ.) says:—

> "The confidence of the attacking witnesses is often in proportion to the distance in time that one is removed from the other. Their imagination is wrought upon by influences to which their ears are subjected, and beguiles their memory."

This general proposition fits the facts of the case at bar.

In the recent case of *Nicholas Power Co.* v. *C. R. Baird Co.*, 222 Fed. Rep. 933, Judge Mayer states very well the test which should be applied to the McBerty defense:—

> "This case has given me some practical realization what a jury contends with when the court charges the doctrine of reasonable doubt in a criminal case, and after much consideration and a good deal of debate with myself I can only say that I am not convinced beyond a reasonable doubt. In other words, if, sitting as a juror, I were charged that, if I believed that it was proved beyond a reasonable doubt that Wooden had used the valve at the time in question, then he was guilty, I would bring in a verdict of not guilty; and if, *per contra*, I were similarly charged that, if Wooden had not used the valve at the time in question he was guilty, I should likewise bring in a verdict of not guilty — and both results would be because I entertained a reasonable doubt.
>
> "But there is something besides the question of reasonable doubt upon this branch of the case. I think that even if Wooden's recollection is right, the testimony shows that the valve and the machine with which it was made *were experimental and afterwards abandoned.* Wooden evidently had no appreciation of what the valve accomplished, and, instead of giving something to the world, he consigned the structure

literally to the junk heap, where doubtless it would have still remained, had this litigation not occurred.

"In what has been observed supra I am to be understood as not reflecting in the slightest upon the uprightness of Wooden. He looks and acts like an honest and truthful man, but experience in the court room teaches that honest men, after much thought and talk about just such an incident as this, sometimes become confused as to dates, and reiteration in conversations is often transmuted into a recollection honestly believed in, but inaccurate in point of fact."

In *Thayer* v. *Hart*, 20 Fed. 693, Coxe, J., said:—

"It is so easy to fabricate or color evidence of prior invention and so difficult to contradict it, that proof has been required which does not admit of reasonable doubt."

". . . The evidence of prior invention is usually entirely within the control of the party asserting it, and so wide is the opportunity for deception, artifice or mistake, that the authorities are almost unanimous in holding that it must be established by proof clear, positive and unequivocal; nothing must be left to speculation or conjecture."

EVEN IF McBERTY'S STORY WERE TO BE ACCEPTED AS TRUE IN TOTO, IT AMOUNTS ONLY TO AN ABANDONED EXPERIMENT, INSUFFICIENT TO ANTICIPATE A PATENT.

Having now established, as we believe, that McBerty's story is not and cannot be true, and that all McBerty ever did in 1901 (it is doubtful if he did even this) was at most to make a few unsuccessful experiments, resulting in only such abortive samples as the Lipps Exhibit H, we return to the proposition with which we began our discussion of this defense, namely, that even if the story is true in

substance and in detail, still the defense must fail for the reason that at best all that McBerty did amounted only to an abandoned experiment. The most that McBerty claims to have done was to make a trayful of spot welded fan spiders and blades—about a dozen. This work was done inside of a week, he says, and might have been done in an hour's time unless the machine overheated (Vol. II, p. 821, X-Q. 445; p. 822, X-Qs. 456–459). The experiment was admittedly abandoned and no more fans of the kind were ever manufactured after February, 1901. Thereafter the machine was used only for its regular intended purpose, butt welding the ends of guard rings.

Even defendant's own witnesses characterize the operations as purely experimental. Thus Craft testifies (Vol. II, p. 787):—

> "X-Q. 185. Do you regard this matter of welding blades to spiders by spot welds as experimenting or not?
>
> *A.* Yes, **most distinctly experimenting.**"

Similarly Lipps says that the fans alleged to have been spot welded "were not going through the commercial part of it", but the thing was **"just experimental"** (X-Qs. 83–85, Vol. II, p. 923). And Powers also says:—

> "All of the spot welding that I can recall was **experimental or development work.**" (Q. 35, Vol. II, p. 875.)

Similarly Brown in his affidavit, prepared by Mr. Howe in collaboration with McBerty himself, says:—

> "This spot welding was not done on any commercial product of the company, for as I understood it there was no commercial product of the company to which it was adapted as a commercial proposition." (Vol. I, p. 482.)

Indeed, McBerty in his letter to his own counsel, Mr. McGill, when he first presented the matter to him, classifies his work merely as "experimenting", saying:—

> "I have also samples of spot welding which was done on the welder at the time we did **this experimenting.**" (See his letter under date of January 2, 1912 [error for January 2, 1913], Vol. II, p. 945.)

This was written after Mr. McGill had expressly warned him in his letter of December 10, 1912 (Vol. II, p. 951), that "if the machine was constructed and used in an experimental way and then abandoned, it will not be available as a defense".

Indeed, *the affidavits and testimony of McBerty and his other witnesses are in considerable part devoted to showing why it was that the matter never got beyond the experimental stage and was abandoned instead of being adopted commercially.*

Under these circumstances, what McBerty did, even if we were to accept his whole story as true, falls clearly within the authorities which hold that abandoned experiments do not anticipate a patent. It was a mere experimental trial of the process and even if it happened that some few articles produced in the experimenting were sold, the use of the process was none the less mere experimentation, shortly abandoned. We cite a few of the many authorities on this point.

In *The Corn Planter Patent*, 23 Wall. 181, 211, a machine was used for planting five acres of corn, "but the machine was never used again, and was afterwards broken up and no other was ever made". The court held that there was no anticipation, on the ground that the alleged prior invention was a mere abandoned experiment.

In *Smith* v. *Goodyear Dental Vulcanite Co.*, 93 U. S. 486, 498, the Supreme Court held of certain experiments and

manufacture which closely resembled the patented process:—

> "The experiments resulted in nothing practical. . . . In consequence of these and other objections *the manufacture* was soon abandoned, and it may properly be considered an abandoned experiment."

In *Warren Bros. Co.* v. *City of Owosso*, 166 Fed. 309 (C. C. A. 6th), the suit was on the Warren bitulithic pavement patent, filed 1901 and granted 1903. The principal defense was a sidewalk laid by the Asphalt Street Paving Company (the real defendant) before its office in 1897. The court did not decide whether or not this sidewalk had the same structure as the patented pavement, simply stating (p. 315) that if defendant's evidence is to be believed it had the structure claimed in the Warren patent. The sidewalk was held not to anticipate since it was a mere experiment, saying (p. 315):—

> "That somebody had, in fact, made the same composition before he did does not necessarily defeat his patent. In one sense, he would not be the first inventor in such case. But, in the sense of the patent statute, he is the first inventor who by his own thought, makes an article or material and first perfects and adapts his discovery to actual use, *although someone may have previously made a similar article without putting it to practical use or giving his discovery to the public in any way.*". . .
>
> "The presumption is strong that the experiment was not regarded as successful in teaching anything of value to the pavement art, for it was never repeated, and no sidewalks were ever put down of that character, although that kind of work was a part of their business. It was an experiment when the pavement was laid, and continued to be such until the

> result could be proved. The subsequent continued use of their old sand and asphalt mixture, both for sidewalks and street purposes, for nearly six years and down to the infringement here complained of, is conduct plainly indicating that they had abandoned their efforts to find a better composition and treated the experiments of Upham in 1896 as unsuccessful."

In *Gamewell Fire-Alarm Telegraph Co.* v. *Municipal Signal Co.*, 61 Fed. 948, 952 (C. C. A. 1st Cir.), the court held that the Noyes patent was not anticipated by the Wood device, which had been embodied in a model and described in an application for a patent, saying:—

> "The only use ever made of it by Wood was merely experimental. It was never used for any practical purpose."

In *Hoyt* v. *Slocum*, 26 Fed. 329, 330, it was claimed that the prior use of two Harvey bottle-washing machines anticipated the patent in suit. One of these machines "was only used for a limited period by the person who invented it, and whose business made it necessary for him to wash bottles, and was then abandoned". The other machine was used "at times during several months", and was abandoned "principally because it ran so hard". Judge Colt held that there was no anticipation, saying:—

> "Both these Harvey machines were thrown aside after a short time, and they may fairly be considered as abandoned experiments; at least the priority of the Harvey machine has not been proved with the clearness and certainty which are necessary."

In *Mast, Foos & Co. et al.* v. *Iowa Windmill & Pump Co.*, 68 Fed. 213, 223, the patent was for a pump, and it was claimed to have been anticipated by a single pump that was actually made and used in a well years before the

invention was made by the patentee. The court (Shiras, J.) said:—

"It is well settled that to sustain the defense of prior invention or use, the evidence must be clear, satisfactory, and such as to leave no reasonable doubt as to the material facts. Furthermore, when it appears that several parties have been independently engaged in experiments upon the same invention or device, the one who succeeds in first giving it a practical form, who brings it to public knowledge by obtaining a patent therefor, and makes it of general use and value by manufacturing and causing to be manufactured machines or articles embracing the invention, will be protected in the rights secured by his patent, even though it be shown that another may have mentally conceived the invention at an earlier day, *or even if, in addition to the mental conception, he may have embodied it in a successful experimental form and then abandoned it. The benefits and protection of the patent law are not for those who indulge in speculations and experiments only*, but are intended to protect those who make available to the public novel and useful inventions by following up the original conception, carrying it through the experimental stage, and so far perfecting it as to furnish to the public a practical means of utilizing the novelty sought to be patented. *Barbed Wire Patent*, 143 U. S. 275, 292, 12 Sup. Ct. 443, 450; *Coffin* v. *Ogden*, 18 Wall. 120; *Cantrell* v. *Wallick*, 117 U. S. 689, 6 Sup. Ct. 970; *Deering* v. *Harvester Works*, 155 U. S. 287 15 Sup. Ct. 118. It may, therefore, be admitted that the evidence shows that Johnson was experimenting in the same direction pursued by Martin, and that his efforts in this line antedated those of Martin; but it is no less clear that if the public knew no more of the

invention than was communicated to it by the making and use of the Felger pumps, in 1883 and 1884, it would be in entire ignorance of the improvement. *The experiment was made and then abandoned; that is to say, it was not made the basis of an application for a patent, nor was the manufacture and sale of pumps embracing the invention entered upon.* I do not, therefore, deem it necessary to consider in detail the evidence upon the question of the actual date of the making of the Felger pumps, as it must be held that they do not defeat the Martin patent, even if made before the date thereof."

In *Standard Sanitary Mfg. Co.* v. *J. L. Mott Iron Works*, 152 Fed. 635 (affirmed 129 Fed. 135, C. C. A. 3d Cir.), Judge Cross said (p. 638):—

"The defendant, however, alleges that the patent is invalid because of the prior use of an unpatented pneumatic device of a like character to accomplish the same purpose. In support of this contention considerable evidence has been produced, from which it appears that a few bath tubs were enameled with some degree of success by the defendant in the fall of 1896 by a device in some respects similar to that defined in the complainant's patent; but I think that the evidence, considered as a whole, discloses nothing more than an abandoned experiment. The device — there was but one — was in operation, so that workmen who used it say, off and on for about a week or ten days, although one or two other witnesses intimate that it was used for a somewhat larger period. It was then unquestionably dismantled, and was not again used; nor was anything like it used for several years afterwards, and not until after the defendant had removed its works from Mott Haven, N. Y., to

Trenton, N. J. . . . It certainly was used but a very short time, and was then abandoned."

The defense was therefore held insufficient.

SUMMARY AS TO McBERTY DEFENSE.

McBerty had a butt welding machine in 1901 and on it he possibly may have done some unsuccessful and fruitless experimenting, resulting in such abortive products as the Lipps Exhibit H, which fell very far short of any tangible or usable result. We deny that even this much is proved.

In 1913, confronted by a charge of infringement of the Harmatta patent, McBerty seized upon his 1901 abandoned experiments as a club with which to force a "settlement" with the Thomson Company. He, therefore, worked up affidavits in conjunction with his counsel, Mr. McGill, approached the Thomson Company with them, and made a proposition to sell his evidence to them for suppression.

Honest men do not make such propositions.

When this proposition was rejected, McBerty communicated his story to the counsel who were defending the Barney & Berry case and spent weeks of his time aiding them in collecting evidence and affidavits, giving them every possible assistance in the effort to build up a successful defense. When these affidavits were all collected and considered, McBerty's story was rejected by these counsel — among the most capable, successful and reputable firms at the bar — as being not true, and if true, as only amounting to the attempted resurrection of an abandoned experiment.

McBerty then took a license under the Harmatta patent for his company, in which the validity of the patent was recognized.

Then in 1917 the "Welding Patents' Investigating Com-

mittee" appeared on the scene, saw McBerty and in co-operation with him took steps to revive the discredited defense.

His growing legal experience had now taught McBerty that his story as previously told had at least two fatal defects — (1) lack of commercial use of the process — and (2) lack of record date evidence. So, now, the story experienced a prodigious growth.

The cut of the G-2 fan in the Warren Company's 1901 catalogue was found and seized upon as plausible "record evidence" in support of a proposition never before advanced or hinted at by McBerty to his own counsel or to the counsel for the Barney & Berry Company, namely that a dozen or fifteen fans with spot welded spiders and blades had gone into the commercial output of the Warren Company. This catalogue cut is really the whole basis upon which this "trayful of fans" addition has been built.

But it is now shown by defendant's own witnesses that the catalogue was published months before February, 1901, when McBerty claims to have done this spot welding, and even months before the butt welding machine on which he claims to have done the work was set up. Moreover the cut shows not a rivetless, but a riveted fan.

Further to support the story, McBerty now (in 1917) reconstructed his old 1901 spot welder, parts of which he had found in the junk room of the Peerless Company, and remounted it in such a manner that fan blades and sheet steel spiders could be inserted within it — which had been impossible as it was mounted in 1901 — and put on a new transformer capable of giving sufficient current for spot welding, which the 1901 transformer could not do — and proceeded to make some samples of spot welded work on this reorganized machine.

Forthwith there appeared at the same time, 1917, something which had been utterly lacking at the time

when the facts were so fully investigated in 1913 by McBerty's counsel and by Mr. Howe, namely a dated specimen, — McBerty's Exhibit M, — which is clearly shown, we submit, to be spurious.

This misleading catalogue cut, this remodelled machine and these recent specimens of spot welded work were diligently shown by McBerty and the defendant's witness and paid agent, Smith, to many persons who in 1913 when interviewed by Howe and McBerty had failed to remember any spot welding, and by this means and by dint of persistent coaching, some few of these persons were induced to come forward with testimony wholly inconsistent with their 1913 affidavits and to say what they may or may not have come now to believe, that they remember seeing spot welded fan blades in the year 1901. But no one of them goes so far as to say that he ever actually saw McBerty or anyone else doing the work of spot welding the dozen or fifteen fan blades and spiders which McBerty tells about; and many witnesses who were in a position to know what was done on the 1901 machine could not be so persuaded; they testify that they never knew of this machine being used for any purposes other than butt welding.

No fan with spot welded blades is produced, and absolutely the only alleged contemporaneous specimen of the McBerty work testified to by any other witness than McBerty himself is the Lipps Exhibit H, which is not spot welded at all, but a mere unsuccessful "stick". This exhibit, put in evidence not by defendant but by plaintiff, by itself, if valid, alone goes a long way to prove that McBerty never did any real spot welding in 1901, for naturally Lipps would have preserved as good a sample as he could have found of McBerty's work.

There is then no record evidence whatever, "no contemporaneous concrete evidence that speaks for itself" of any kind, but only the discredited word of McBerty him-

self, and the inconclusive and contradictory oral evidence, eighteen years after the event, of a few witnesses coached by spurious and misleading exhibits and contradicted by their own 1913 statements.

But the story cannot be true. It breaks down when its details are analyzed. As we have shown there are at least three positive reasons why McBerty cannot have done what he claims to have done in 1901; namely (1) that the machine as it was in 1901 had not sufficient space to accommodate fan blades and spiders; (2) that it had not a transformer capable of supplying adequate current for spot welding and (3) that the spiders used on the G-type fans were not steel but brass.

The McBerty story does not fail merely for lack of proof but because it is positively disproved.

And, finally, if it were all true throughout, trayful of fans addition and all, it would still be no defense, because, even so, it would clearly fall within the category of abandoned experiments which do not militate against the validity of an issued patent.

EVENTS OCCURRING AFTER DECEMBER 3, 1903, CANNOT AFFECT THE VALIDITY OF HARMATTA'S PATENT.

The application for the Harmatta patent in suit was filed December 3, 1903, at which time Harmatta's rights to his invention became fixed and nothing occurring thereafter can affect the novelty or standing of that invention in the art.

Consequently the proofs offered by the defendant as to any spot welding done subsequent to December 3, 1903, are immaterial to the issues of this case, which relate only to the novelty and patentability of Harmatta's invention at that date.

It is immaterial that William E. Smith in 1905 may have

built a welding machine (long since scrapped) for butt welding at the works of the Carnegie Company, however much that machine might have resembled the McBerty welder (Smith, Q. 133, Vol. I, p. 504; McElray, Vol. II, p. 910), and it is likewise immaterial if at some later date the machine was altered over to do spot welding (McElray, Q. 21, p. 911).

It is also immaterial if Taylor, another of defendant's witnesses, made a roller welder for the Winfield Company in 1904 (Q. 56, Vol. II, p. 897), which he later used for spot welding (Q. 45), or if the Winfield Company later built a butt welder (Q. 64) and later a spot welder (Q. 68). Taylor's testimony, taken at its face value, simply shows that he invented spot welding at a later date than Harmatta. Taylor's statement that in 1903 he saw spot-welding at the factory of the Peerless Company, the successor of the Warren Company (Q. 16, Vol. II, p. 893), is not to be credited, for both McBerty and Smith admitted and indeed stated most emphatically that no spot welding was done at that factory after the year 1901 (Vol. II, pp. 830, 831, and Vol. I, p. 520).

Whether spot welding was first developed in the United States from knowledge derived from Harmatta or from knowledge derived from some later inventor is not of prime importance. Harmatta's rights were fixed by the filing of his application December 3, 1903.

The fact is, however, that spot welding was first introduced commercially into the United States directly through Harmatta and the Eisenhutte Silesia Company, the owner of Harmatta's rights, at the works of the National Enameling & Stamping Company of Baltimore, Md., in 1904 (*supra*, page 14). Since then the National Company has built and used between eighty and one hundred spot welding machines (Herring, Q. 18, Vol. I, p. 132). The enormous amount of kitchen-ware made by

that company in which the sheet metal parts were united by Harmatta's spot welding of course carried the knowledge of this new art all over the United States.

With this extensive commercial use of spot welding in the United States, directly developed from Harmatta's invention, so fully proved, any basis for any argument that the defendant may make to the effect that the commercial use of spot welding did not originate with Harmatta, is entirely swept away.

It was not until two or three years later, that is in 1906 or 1907, that the Winfield Company, confessedly the first outside of the National Enameling & Stamping Company to practice spot welding commercially, started to put spot welders on the market (Taylor, Q. 73, Vol. II, p. 898). The first of these was sold in 1908.

All these occurrences took place long after the date of the filing of Harmatta's application and are really of no direct importance in determining the standing of Harmatta's invention in this case, and would not be discussed but for defendant's arguments about them.

CHAPTER IV.

THE RELATIONS OF THE PLAINTIFF TO RIETZEL AND TO THE RIETZEL PATENT.

The application for the Harmatta patent in suit was filed December 3, 1903. This is the Harmatta date of invention for the purposes of the case. From and after that date he had an absolute right to patent the invention disclosed in that application if it were found to be new and patentable. This he did in the patent in suit.

In prosecuting the application he complied with all the provisions of law and is in no way responsible if because of the cumbersome character of Patent Office proceedings, the record was to some extent confused or the issue of his patent was delayed.*

The Rietzel patent No. 928,701 (Vol. II, p. 1098), was applied for February 24, 1905, and issued July 20, 1909. Of course, this patent is too late to affect Harmatta's rights.

It was open to the defendant to show that Rietzel was the prior inventor. It called Rietzel as a witness. We have already shown (*supra*, p. 69) the utterly frivolous character of the definitely abandoned experiments to which Rietzel testifies as having been made by him in 1898, five years before the date of Harmatta's application and seven years before Rietzel's application for his patent. Rietzel was certainly not the prior inventor.

We submit that this is all there is to any defense based upon Rietzel or his relations to the general situation.

But the defendant in the Court below sought to develop

*We call attention to the law on this point as stated in the case of *U. S.* v. *American Bell Telephone Co.*, 167 U. S. 224, 248.

from the relations of the parties a defense which it seems to present as in the nature of an estoppel, not affecting in the slightest degree the facts in the case or Harmatta's clear right to the patent as far as Rietzel or his work is is concerned.

Defendant's argument seems to be that because there appeared in the Rietzel patent of 1909 certain claims which *at the suggestion of the Patent Office* were incorporated into the Harmatta application in the year 1910, which claims clearly and definitely define Harmatta's invention and as such were allowed and appear in the Harmatta patent in suit, and because Rietzel filed certain affidavits in the course of his application and certain preliminary statements in an interference with Harmatta's application which contained some general statements which Rietzel, when called as a witness, failed adequately to support, and because the plaintiff's predecessor was the owner of the Rietzel application and patent and subsequently purchased the Harmatta application in the year 1912, in some way the plaintiff is estopped from holding the defendant for its clear infringement of the Harmatta patent.

Regardless of any other consideration, it seems certain that there is no element of estoppel in the situation. Neither the plaintiff's predecessor nor Rietzel has done or said anything upon which the defendant might properly rely as justifying it in its infringement of the patent in suit. Nothing that they or either of them said or did was in fact relied upon by the plaintiff in initiating and carrying on its infringement. No injury to the defendant because of anything said or done by Rietzel or the Thomson Company is even alleged. The defendant relies only upon the fact that Rietzel during the progress of his application and in his preliminary statements made certain allegations which upon investigation he was unable to prove and upon the confusion that arose from a very difficult situation in which the old Thomson Company found

itself involved when it learned of the Harmatta invention and that it was Harmatta and not Rietzel who was entitled to certain claims in the Rietzel patent which was at that time owned by the Thomson Company. A brief statement of the history of the two applications and of the way in which the rights of the matter were worked out by the Thomson Company and the Patent Office will show how utterly without foundation is this contention of the plaintiff.

In the year 1904 Rietzel developed the specific projection welding process which he disclosed in his patent (Vol. I, p. 659, XQ. 162). This was his first real work and the earliest date upon which he can stand for any invention patented in his patent No. 928,701, for his abandoned experiments seven years before are clearly to be ignored. The welding invention which Rietzel made in 1904 was in no sense the Harmatta invention. He was, to be sure, seeking to unite by electric welding two sheets of metal, a thing which had not been done before by anyone except Harmatta, whose invention had been completed by the filing of his application December 3, 1903, but Rietzel's method was utterly unlike that of Harmatta. It is well disclosed in the Rietzel patent.

Rietzel's thought was to unite two sheets by the following method: First, as a preliminary step, he made a series of projections on one or both sheets by bending up the metal as shown in Figs. 1 and 2 of his patent or by putting metal points or projections on the face of one or both sheets as shown in Figs. 3 and 4 of his patent, or by introducing a series of metal pieces between the sheets as shown in Fig. 5 of his patent which acted like points or projections. These points or projections were to obtain "the localization of the flow of heating electric current and of welding pressure to the desired spot or spots" (Rietzel Patent, p. 1, lines 93-96).

His preferable method was "to provide projections from the meeting surfaces of both pieces that are to be united" (Patent, p. 2, lines 22–25), although his idea would be practised if he had projections on only one sheet or even if he interposed between the two plane sheets "small pieces of conducting material" which act in the same manner as projections for localizing the heating current and the pressure (Patent, p. 2, lines 26–31).

His electrodes, utterly unlike the tapered electrodes of Harmatta, the end of each of which is of the size of the spot to be welded, are shown at A, A′ in each of the first five figures of the Rietzel patent and described as "conducting blocks" covering the *entire series* of spots to be welded. "These electrodes, A, A′, furnish the heating current while applying the pressure, the localization of the pressure in the spots being brought about" by the points or projections or inserted pieces of conducting material (Patent, p. 2, lines 98–107).

When the current is applied it passes through these large "conducting blocks" or electrodes (from one to the other) when "the application of pressure together with the flow of heating current from one plate to the other will result in a union of the two pieces over their opposed surfaces in spots only thereon" (Patent, p. 2, lines 119–124).

It is worth while to quote two passages from the Rietzel patent. The first is page 1, line 92, to page 2, line 40, which is as follows:

> "In carrying out my invention the localization of the flow of heating electric current and of welding pressure to the desired spot or spots may be brought about in any desired way. One of the preferred ways is by providing between the meeting surfaces or portions of the pieces to be united suitable conducting projections or points at the spots of union, which projections or points carrying the heating electric

current from one piece to the other are so located in the meeting surfaces and are separated from one another that on the application of the welding pressure the welded union resulting will be localized in the area of the opposed surfaces and will be substantially coextensive in area with the restricted area of the path of the effective heating current. Various ways of providing such points or projections will occur to those skilled in the art.

"The preferred method is to indent the metal from the side reverse to that on which the union is effected by a suitable tool, the projections thus formed affording points for the passage of the electric current. This method is preferable also because it permits the welding to be produced at a multiplicity of spots simultaneously through the application of pressure over the whole rear surface of the plate, the points or projections in that case serving not only to localize the flow of the heating current but also to localize the welding pressure.

"In the preferred manner of carrying out my invention in the case of sheet metal manufacture I provide projections from the meeting surfaces of both pieces that are to be united. Said projections may also be provided by interposing between the two plane sheets small pieces of conducting material which act in the same manner when the sheets are brought together, as projections which localize the heating current and the pressure. It will be understood, however, that in the latter instance as in the former, these pieces are so small and are placed such a distance apart that on the application of welding pressure there will be no running of the welds into one another but that the final union will be in spots only leaving well-defined areas on the meeting surfaces, in

which the surfaces either lie in contact or separated from one another by a very thin space."

The second is at page 3, lines 23 to 30, as follows:

"When the invention is employed in its preferred form or manner of practice in the field of sheet metal manufacture all that is necessary is to provide the contact spots or projections as already described and then to assemble the pieces in an electric welding machine and weld them together as already set forth."

As already stated, this Rietzel process is one of "butt welding". It may be described in the exact terms that would be used in describing the Thomson butt welding operation of his fundamental patents. It is utterly different at every stage from the process patented by Harmatta. In Rietzel, when the plates are put together at the beginning of the operation, they are not in contact except at the points or projections (the inserted piece of metal of Fig. 5 is in all respects the same as a projection). In Harmatta the current and pressure are localized solely by the electrodes which are pointed, the point being of the size and dimensions of the spot to be welded. In Rietzel the electrodes are "conducting blocks" which cover a substantial area of the plates within which are a series of points or projections.

But the result of the Rietzel process would be sheets welded at spots, of which Harmatta and not Rietzel was clearly the first inventor. In so far as the process was one of welding in spots, the points or projections on the plates of Rietzel were of vital consequence, as with his process the welded spots were obtained by butt welding these spots or projections. Harmatta has no points or projections but, as we have shown, works upon an utterly different principle.

It is obvious, however, that as a matter of words, phrases may be found which would apply to both processes but having a different meaning as to each. But Harmatta invented his process long before Rietzel invented his so that Harmatta was entitled not only to the claims for the product but also to any claims so vaguely drawn as to define both processes.

While Rietzel's app'ication for point and projection welding was pending, the Patent Office on the eighth day of June, 1908 (Vol. III, p. 1760), called attention to the British patent to Harmatta No. 22,981 of 1903 accepted August 25, 1904, its effective date. This patent (Vol. II, p. 1123) describes among other things the precise electrode spot-welding process of the United States Harmatta patent in suit. It states (p. 1128): —

> "If now, for example, two overlapping sheet metal ends to be welded be introduced between the electrodes *a*, *b*, and the latter pressed towards one another and current allowed to flow, then a small round and clean welding point is obtained which fully takes the place of a rivet."

The Patent Office said (Vol. III, p. 1760):—

> "Fig. 4 of this [the British] patent shows a spot weld, which takes the place of a rivet."

Thereupon Rietzel's so'icitors, properly anxious to get as broad claims as possible for their client, redrafted Rietzel's specification and claims to cover broadly the idea of making a weld which would take the p'ace of a rivet between two sheets of metal by localizing the current and the pressure at the spot to be welded, however it was done. (Vol. III, pp. 1762-1775).

Their theory undoubtedly was that the finished spot welds produced by the two processes were practically the

same and that claims might be drawn on Rietzel's utterly different process which would cover the Harmatta process.

In making these substantial amendments to the Rietzel application, Rietzel's solicitors clearly had in mind the fact that Rietzel had actually reduced his projection welding invention to practice in June 1904, for they filed simultaneously an affidavit for Rietzel to that effect (Vol. III, p. 1778). This date, of course, was prior to August 25, 1904, the effective date of the Harmatta British patent, the only Harmatta patent to which their attention had been called.

The Patent Office then cited the French patents to Egel (Egel was patenting the Harmatta invention; under French law the inventor himself need not file the application) No. 336,187 and 335,889 (Vol. III, p. 1788). No. 336,187 (Vol. II, p. 1144) is substantially the same as the original specification of the application for Harmatta's United States patent. It was published March 1, 1904. No. 335,889 was published February 18, 1904 (Vol. II, p. 1132). These dates were back of June, 1904.

Thereupon Rietzel's solicitors, undoubtedly informed by Rietzel that he had done something on the line of his invention at an earlier date, filed an affidavit that he had made spot welds by the use of a "pointed electrode" before "*February 18, 1904*", the date of the French patent No. 335,889 (Vol. III, p. 1792).

Both these affidavits were the customary and usual affidavits provided for by Rule 75 of the Patent Office.

It may well be contended that Rietzel's solicitors should have investigated Rietzel's story at this time. If they had done so they would have found that his futile and fruitless abandoned work prior to February 18, 1904, which amounted only to an abandoned experiment, was not adequate to carry back his date. But Rietzel's memory of what he had done in 1898, so many years before the

affidavits were filed in the year 1909, may easily have deceived him into the belief that he had then done something material, although when he came to investigate the subject later, he found that such was not the case.

In any event we respectfully submit that there is nothing in the situation to cast the slightest cloud on the Harmatta patent or the plaintiff's right to enforce the same.

The Rietzel patent finally issued July 20, 1909.

The patent was clearly invalid in view of Harmatta's earlier invention both as to the claims of the product and also as to the broad claims inserted by Rietzel in his application in view of Harmatta, if the same should be construed, as they might be according to their terms, as covering more than the production of projection or point welding which alone Rietzel had invented, for Harmatta had a fixed and certain date for his invention of electrode spot welding, namely December 3, 1903, when he filed his application.

It is to be observed that Rietzel's affidavits which only undertook to carry his date of invention back of February 18, 1904, did not purport to carry it back to December 3, 1903, which is Harmatta's date.

It is respectfully submitted that the whole matter is utterly immaterial and that the Court will be only interested in the determination of whether Rietzel anticipated Harmatta in the invention of the subject matter of the patent in suit. It is perfectly clear that he was not such prior inventor.

The Patent Office was clearly in fault in not calling Rietzel's attention to the Harmatta application for the patent in suit, which had been on file in the Patent Office since December 3, 1903; but the Rietzel patent issued July 20, 1909, without Rietzel or the old Thomson Company, which owned the patent, having any knowledge of Harmatta's application.

Rule 96 of the United States Patent Office provides: —

"96. Whenever the claims of two or more applications differ in phraseology but relate to substantially the same patentable subject-matter, the examiner, when one of the applications is ready for allowance, shall suggest to the parties such claims as are necessary to cover the common invention in substantially the same language."

If, therefore, the Patent Office had had the Harmatta application in mind and had regarded the application of Rietzel as relating substantially to the same patentable subject-matter as that of Harmatta or as having a "common invention", it should have suggested to Harmatta the broad claims of Rietzel and given Harmatta a chance to go into interference with Rietzel before his patent issued.

It seems probable that the Patent Office so thoroughly realized the difference between Rietzel's point and projection welding and the electrode spot welding of Harmatta that it did not occur to it that there could be a "common invention" involved. Even as to the product claims, the Office very likely construed them, carelessly as we think, as limited to the product of Rietzel's process, as they undoubtedly construed his broad process claims as limited to the point and projection and "conducting block" electrode features that were essential to them.

After the issue of the Rietzel patent, the Patent Office did in fact on March 22, 1910, suggest to Harmatta that he was entitled to make Rietzel's broad claims with which alone we are concerned in this branch of the case, thus giving to Harmatta the opportunity of inserting those claims in his application and of going into interference with Rietzel as to those claims.

Meantime, from December 3, 1903, to the date of issue of the Rietzel patent, Harmatta had been pressing his

application, persistently seeking claims for the "electrode process of electric spot welding" which he had fully disclosed in his original application and which Rietzel had never disclosed. But it was only on the suggestion of the Patent Office, calling his attention to Rietzel's claims, that he seems to have realized that upon his application might be based claims for a broad expression of the underlying idea of uniting sheets in spots by a weld to take the place of a rivet *whether the process was the "projection welding of Rietzel" or his own "electrode welding"*. He therefore took advantage of the opportunity offered by the Patent Office to ask for such claims (Vol. II, pp. 1419-1427).

It is immaterial for the purposes of this case whether those broad process claims when added to the Harmatta application (they appear in his patent as Nos. 1–6) do or do not cover more than the Harmatta electrode process of spot welding. For the purposes of this case the plaintiff would be quite satisfied with a construction of them which limits them to the electrode process so clearly defined by Harmatta. As to the product claims, Nos. 17–21 of the Harmatta issued patent, which were inserted at almost the same time, Harmatta was clearly the first inventor of the subject-matter of those claims whether made by his own process or that of Rietzel.

When an interference was declared April 14, 1910 (Vol. III, p. 1838), Rietzel and the old Thomson Company, the owner of his patent, knew for the first time of the Harmatta application.

They must have been greatly disturbed when this was brought to their attention, for here was an application filed December 3, 1903; with broad claims introduced at the suggestion of the Patent Office which might, if a patent should issue to Harmatta with those claims, cover the Rietzel process and product as well as the entire art of spot welding. They took exactly the course that is

always taken under such circumstances. First by motions to dissolve the interference (Vol. III, pp. 1852, 1920–1923) they endeavored to persuade the Patent Office that Harmatta was not entitled to make such broad claims. Failing in this effort, they were face to face with an interference in which was to be tried out the issue of priority of invention. The first step in the procedure had been the filing of preliminary statements. Harmatta stood on the date of his application December 3, 1903. In Rietzel's preliminary statements, he made the allegation that he had conceived the broad invention of his claims late in the year 1897 and that he reduced the invention to practice in the latter part of July, 1898, and at that time first explained it to others (Vol. III, pp. 1843, 1917). Two preliminary statements were filed because after the interference was first declared on certain claims, other claims were added, as to which a second preliminary statement had to be filed.

Thus Rietzel went back in his preliminary statements to his inconclusive, fruitless and abandoned experiments which are described in this record (Vol. I, p. 633, *supra*, p. 69) and if he had all the facts clearly in mind, it may well be contended that he was not justified in making such an allegation. It is reasonable to suppose, however, that when he made the preliminary statements, twelve years after his experimental work, he believed that he could show that he had done much more in 1897 and 1898 than he subsequently found himself able to prove when the situation was really investigated as preliminary to the taking of proofs.

He should perhaps have been more careful in his pleading, but the published opinions of the Patent Office tribunals and reported dicisions in patent cases as well as in interferences, show that it is but human and natural for inventors at the preliminary stages of a controversy

as to prior invention, and sometimes through to final hearing, to rely upon work which upon full investigation proves to be inadequate.

Such was the case here. Upon investigation counsel for the Thomson Company discovered that Rietzel could not carry his date of invention back of Harmatta's application of December 3, 1903, for his work of 1897 and 1898, which was all the work done by him prior to 1904, was merely futile and fruitless experiments which were utterly without significance. Also they were clearly abandoned for Rietzel did nothing after 1898 until the middle of the year 1904 after Harmatta's application had been filed (Townsend, Vol. I, p. 214, Q. 3).

We have (*supra*, p. 208) quoted decisions establishing the law on this point. We add here a few decisions of the Court of Appeals of the District of Columbia in interference cases to the same effect: —

Mason v. *Hepburn*, 1898 C. D. 510.
Warner v. *Smith*, 1898 C. D. 517.
Thompson v. *Weston*, 1902 C. D. 521.
Matthes v. *Burt*, 1905 C. D. 574.

The law is definitely settled.

The only course that seemed open to the old Thomson Company, to protect itself and its licensees and to save its commercial situation from ruin, was to buy the Harmatta application. It therefore sent Mr. Tischner abroad to see Harmatta and the Eisenhutte Silesia Aktien-Gesellschaft, which controlled his application. Tischner's mission was successful (Vol. I, p. 215). Harmatta executed an assignment of his application to the Thomson Company, February 3, 1912, which was given to the Silesia Company to be delivered to the Thomson Company when the agreement between those companies was "formulated and executed". This agreement (Vol. I, p. 429) was

delivered April 3, 1912, and with it the assignment, which was immediately recorded in the Patent Office, April 5, 1912 (Vol. III, p. 1948).

A very common situation was thus created where the rights of two interfering parties are owned by the same interest, in this case the Thomson Company. The Patent Office had been frankly informed of the situation by the recording of Harmatta's assignment. The Thomson Company had a choice of two courses of action. It could hire attorneys on each side to fight the interference through, take testimony on both sides, and carry the case to final decision through all the tribunals of the Patent Office and to the Court of Appeals for the District of Columbia, all of which would have involved a delay of years in the issue of the Harmatta patent; or it could investigate the facts, decide which of the two inventors was prior to the other, and stand on the patent to that inventor, thereby saving delay, litigation, expense and trouble and a prolongation of the patent monopoly.

The Thomson Company chose the latter course, which is a usual and clearly proper course under such circumstances and one which has been approved by the Patent Office and by the courts (*infra*, p. 233).

To bring this result about, the usual formalities were followed, Rietzel took no testimony, and on motion of Harmatta's attorney of record the issue of priority was decided July 22, 1912, in favor of Harmatta.

The Patent Office then further considered Harmatta's application, October 17, 1912, and cited a number of prior patents (Vol. II, p. 1434).

The attorneys for the Thomson Company, who had been substituted for Harmatta's former attorneys, amended the application, October 26, 1912 (p. 1436), nine days after the action of the Patent Office. This amendment brought the specification and claims to their present form.

The Patent Office allowed the application, October 31, 1912. The final fee was paid November 4, 1912 (p. 1455). The patent issued December 3, 1912. In all *only eight months* elapsed from the time the Thomson Company obtained title to the application to the time when it was issued. This is a record of extraordinary expedition.

The propriety of settling such a controversy as the Harmatta-Rietzel interference in this manner has been recognized by the courts.

In General Electric Company v. *Laco-Philips Company*, 233 Fed. Rep. 96 (S. D. N. Y.), the General Electric Company had acquired three pending applications for the Tungsten lamp which were in interference. The General Electric Company, instead of fighting the interference through, investigated and determined which application should prevail and had the patent issued on that application. This course of procedure was approved by the court (p. 100), which says:—

> "The situation was that the plaintiff had paid large sums of money for these applications and naturally was interested in securing a valid patent. It was, of course, a matter of indifference to plaintiff which application was successful, provided that the patent was rightly issued to the first and real inventor. Thus a heavy responsibility was laid upon the attorneys for plaintiff, and, as a result, a thorough investigation was made by them, and after cautious and thoughtful consideration, plaintiff was advised that the patent should issue in favor of the Just & Hanaman application. The fact that the plaintiff, under the advice of careful and experienced counsel, thus decided for itself upon which patent to stand, is evidence of an open and frank manner of dealing with a difficult problem, and ipso facto relieved the proceeding of

any suggestion of collusion, which might have followed had different counsel been engaged by plaintiff to urge the merits of the respective applications then pending."

The decision of Judge Mayer in the District Court was affirmed by the Court of Appeals, which adopted Judge Mayer's decision as its own (p. 107).

It seems clear that there is nothing in this story which affects the validity of the Harmatta patent or the right of the plaintiff to enforce it. The preliminary statements of Rietzel like his affidavit above referred to, even if they be criticised as careless — and we do not believe that they are a fair subject for condemnation — can not affect the rights of the parties in this controversy. There is certainly no element of estoppel. If Rietzel made a mistake, it was a natural mistake of fact, or rather of mixed fact and law, for which he is to be condemned, if at all, only for exaggerating what he had done, and for not at the time fully investigating the subject. His statements deceived no one and no one acted upon those statements to his own detriment. The defendant certainly has not been harmed in the slightest degree, neither has the public. A patent for the electrode spot welding invention has been issued to Harmatta, who was certainly the first inventor both of the process and the product. He was clearly entitled to that patent. The grant of just this patent to him is exactly what the patent law contemplated. There is clearly no element of estoppel which affects the situation.

Blemishes in procedure and careless misstatements and exaggerations are frequently made as part of the complicated procedure in the Patent Office. We call attention to a few authorities showing how the courts deal with

such errors although we respectfully submit that in this case there is no occasion for any appeal to authority.

In *Commercial Mfg. Co.* v. *Fairbank Canning Co.*, 27 Fed. Rep. 78 (N. D. Ill., Blodgett, J.), the patentee had stated in his application for a patent that the invention was the same as that for which he had taken out certain foreign patents. This statement was made in an affidavit. On suit on his United States patent, the defendant set up that the United States patent had expired with these prior foreign patents, the invention being the same, and the defendant urged that the plaintiff was estopped from denying the identity of the inventions in the American and foreign patents by reason of the statement made and filed in his affidavit in the Patent Office. The court held that the plaintiff was not estopped to deny that the same invention was involved in the American and foreign patents, saying (p. 81):—

> "We think there can be no doubt from the proofs in the case that both Medge and his solicitors, who are men of high standing in their professions, thought at the time the original patent was applied for that they were covering the substantial process which Medge had patented abroad; but if these parties were laboring under a mistake, their rights ought not to be defeated or seriously abridged by such mistakes, and we therefore feel compelled to examine the proof as to the identity of the foreign and American patents."

The decision of Judge Story in *Barrett et al.* v. *Hall*, 1 Mason, 447, is to the same effect. This was a suit on a joint patent where each of the joint patentees had previously obtained separate patents for the same invention and afterwards they had obtained the joint patent in suit. The lower court charged the jury that the existence of the two prior sole patents for the same invention granted to

the same patentees did not affect the validity of the joint patent declared upon. He also directed them that the oaths of the plaintiffs respectively, made when they obtained the said prior sole patents that they severally believed themselves to be the true inventors of said machine, did not preclude them from showing a joint invention of the same machine and to claim as joint patentees therefor. On appeal Judge Story held that this charge to the jury was correct, saying (p. 474):—

> "In the next place, if several patents are taken out by several patentees for a several invention, and the same patentees afterwards take out a joint patent for the same as a joint invention, the parties are not absolutely estopped by the former patents from asserting the invention to be joint; but the former patents are very strong evidence against the joint invention. The reason of this doctrine is, not that estoppels are odious in the law, but that a party may innocently mistake, as to the extent of his own claims; and though a sole and joint invention, by the same persons of the same thing, cannot exist in fact, yet a party may suppose, that he has invented, what in truth has been partly suggested by another mind."

In *Kohler* v. *Kohler & Chambers*, 47 O. G. 247; 1888 C. D. 19 (decision of Commissioner Hall), Kohler and Chambers filed a joint application, and subsequently Kohler filed a sole application for the same invention. The two applications had been assigned to different parties, and an interference having been declared the assignees of the joint application, which had issued into a patent, moved to dissolve the interference on the ground that no patent could issue to Kohler as sole applicant under these circumstances. The motion was overruled, the Commissioner saying that the interference would develop the

truth as to whether the invention was joint or sole, and that the applicant Kohler was not estopped by reason of his oath, filed with the joint application, from asserting his rights as sole inventor and that he should not be

> "denied a patent on account of having made an error or mistake as to the matter of his joint inventorship."

This situation has frequently arisen in the Patent Office, which has uniformly followed the decision in *Kohler* v. *Kohler & Chambers*. See, for example, *Ex parte Schaeffer*, 1896 C. D. 30; 76 O. G. 1118.

Directly in point is the decision of Commissioner Mitchell in *Mead* v. *Brown*, 1889 C. D. 173; 48 O. G. 397, which held that an applicant in a pending interference, who claimed to have been the sole inventor, is not estopped by reason of his oath in a preliminary statement in a previous interference, wherein he was one of two joint applicants, nor by the testimony of his witnesses in that interference, from correcting an error, if an error could be shown to exist, as to the date when his invention went into public use. The Commissioner says (p. 175):—

> "If it should be held that no consideration of justice, truth, or fact could avail to authorize the senior party to prove the actual date when the invention went into public use, then, if the fact should be otherwise than is asserted by the junior applicant, the latter might take a valid patent, while the earlier applicant would have been denied a patent because of the statutory bar of two years' prior public use. A method of administration which involves such a result must be a mistaken one, and I am compelled to the conclusion that under his present application, at some stage of the proceedings arising upon it, Brown is at liberty to show, if he can and if the office requires it, that his invention was not in public use for more than two

> years prior to his sole application. Such being the law, it follows that this is not a case in which an interference has been irregularly declared between one party who is entitled to a patent and another party who is forever estopped from obtaining a patent."

After citing the case of *Kohler* v. *Kohler & Chambers*, *supra*, the Commissioner continues (p. 176):—

> "It seems to me that the same principle is involved in the pending case, and that the party who claims to have been the sole inventor is no more estopped to correct an error, if an error can be shown to exist, as to the date when his invention went into public use than he would be to deny and correct his sworn statement that the invention was originally made jointly with another."

To the same effect see:—

> *Howard* v. *Haywood*, 1899 C. D. 8; 86 O. G. 184.
> *Saffert* v. *Mayer*, 1902 C. D. 30; 98 O. G. 793.

The case of *Union Mfg. Company* v. *Lounsbury*, 2 Fish. 389, cited by the defendant, is not in point.

In that case suit was brought on the reissue of a patent, the original of which and also a later patent for an improved machine had been given extended terms by Act of Congress. The reissued patent was for a process while the original patent was for a machine. The court found that the original patent was "invalid, because it did not and does not describe a practical invention" (p. 392).

The fact that the invention was imperfect was fully brought out in the hearings before Congress on the question whether the terms of the patents should be extended and it was because the Committee of Congress pointed out that "no inconvenience can result to the public, or injury

to any individual by the renewal in the extension of the first patent, because the invention was imperfect", that Congress somewhat illogically granted the extension of the patent in question.

Of course the plaintiffs having asserted before Congress as a ground for the extension of the patent that the invention was imperfect and the patent invalid could not in equity establish the contrary, namely that the invention was complete and the patent valid.

The case is one of many where the courts have held that parties can not enforce a right which they have expressly repudiated, their repudiation having been duly accepted and acted upon.

There are no such circumstances in the case at bar and the *Union* case is therefore not in point.

DEFENDANT'S ESTOPPEL CONTENTION IS CLEARLY UNSOUND.

We shall not take the time of the Court to do more than call attention to one or two incidental details of defendant's argument on this point. Defendant suggests that the old Thomson Company delayed the Rietzel-Harmatta Interference that it might have a longer period for working under the Rietzel patent before the interference was decided, thus apparently adopting our view, that as soon as the Rietzel people knew of the Harmatta application, they must have recognized that ultimately a controlling patent would be issued to Harmatta. There is no foundation for any such suggestion. The Rietzel people did nothing which resulted in delay except to move to dissolve the interference, which procedure is as common in Patent Office interferences as is a demurrer or motion to dismiss in suits at law. Rietzel's preliminary statements and affidavits caused no delay whatever. Nobody was de-

ceived by them and they were a mere part of the ordinary procedure of a Patent Office controversy.

Defendant also alleges as wrongful conduct on the part of the old Thomson Company that it developed a license system under the Rietzel patent under which it received royalties for using spot welding machines and to support this contention refers to a license agreement of August 3, 1912, between the Thomson Company and the American Electric Welding Company (Vol. III, p. 2019). But so long as the Rietzel patent was in force as a valid patent, the Thomson Company was entitled to such royalties and on August 3, 1912, the date of the American Company's license, it owned the Harmatta invention which it had acquired April 3, 1912, and the license was under every patent "that is now or may be hereafter acquired by the Thomson Company". This included the Harmatta patent and the license was a grant under the Harmatta as well as the Rietzel patent. Twelve other patents and applications were specially named in the license.

Defendant also calls attention to two suits brought by the old Thomson Company on the Rietzel patent against spot welding infringers; but at the time of those suits the Rietzel patent stood as a patent covering such infringers. Neither of these suits progressed beyond the pleadings.

It is respectfully submitted that there is nothing material in defendant's contentions as to Rietzel or the Rietzel patent or the relation of Harmatta or of the plaintiff's predecessor thereto.

The opinion of the District Court in this case (Vol. I, pp. 24–50) severally criticises the conduct of the plaintiff's predecessor, the old Thomson Company, as to the prosecution of the Rietzel patent, the prosecution and settlement of the *Rietzel* v. *Harmatta* interference, the purchase

of the Harmatta application and the disclaimer of the claims in the Rietzel patent, of the subject-matter of which, as we have above shown, Harmatta was the prior inventor. The Court even charges fraud in some of these matters. These criticisms and charges are absolutely baseless, as is shown by the history of the events as above stated. We will not take the time of this Court to discuss them further. It is sufficient to say as to the Rietzel disclaimer (Vol. III, p. 1824), that as Harmatta was the first inventor of the subject-matter of the claims in question it was necessary to disclaim them from the Rietzel patent. No charges of fraud have been advanced on behalf of the defendant in the lower courts in this case.

CHAPTER V.

THE BARNEY & BERRY CASE.

Defendant has charged, as far as we can see without any basis whatever, that the case of *Thomson Electric Welding Co.* v. *Barney & Berry, Inc.*, 227 Fed. Rep. 428, was collusive (Vol. II, p. 798). In that case the Harmatta patent in suit was held valid and infringed by the Circuit Court of Appeals for the First Circuit, reversing the decision of Judge Dodge of the District Court, who had held that the patent was invalid for lack of invention.

We deny most emphatically this charge. There is not the slightest evidence to support it.

That case was bitterly contested from start to finish. Even after the decision of the Court of Appeals, the defendant moved to reopen the case in order to consider an alleged new reference, the French patent to Bouchayer, which motion was denied (Vol. I, p. 8).

The answer in that case set up as anticipations of the Harmatta patent thirty-three United States patents, twenty-four British patents, one Austrian patent, five German patents and seven French patents, including all of the patents to which reference has been made in this case except the United States patent No. 574,942 to Robinson and the British patent No. 14,536 of 1894 to Parkinson. The process described in the Robinson patent is merely a variation of the process described in the Kleinschmidt United States patent No. 616,436, which was carefully considered by the Court of Appeals and adds nothing of consequence to the prior art. Parkinson's British patent is for glutting and contains no disclosure or suggestion of spot welding.

The defendant has also asserted that in the Barney &

Berry case the McBerty prior use evidence was "suppressed" (Vol. II, p. 751).

As we have already shown, the "McBerty prior use", which we have discussed fully, was thoroughly investigated in the fall of 1913 by Mr. C. V. Edwards, counsel for the defendant, Barney & Berry, Inc., and affidavits concerning it were obtained by Mr. Thomas Howe, who was associated with Mr. Edwards as counsel for the defendfendant, with the assistance and cooperation of McBerty himself. These affidavits have been offered in evidence in this case and vitally contradict McBerty's present testimony, as we have shown.

The facts are stated by Mr. Edwards, called as a witness for the plaintiff in this case (Vol. I, p. 290): —

> "*A.* I am very certain that there was absolutely no collusion in that case. Before the Barney & Berry suit was brought we had defended another suit for the Toledo Electric Welder Company brought against that company by the Thomson Company; that case was the Thomson Electric Welder Company or Thomson Electric Welding Company against the North & Judd Manufacturing Company, and I believe the Toledo Electric Welder Company was a nominal party also in the District of Connecticut. During the litigation and when the litigation on the Harmatta patent was threatened, Mr. Warren, the principal stockholder and active head of the Toledo Electric Welder Company, took me into his confidence as to the financial status of his company and consulted me frequently from time to time as to the best terms to be made by his company from the business standpoint of extending his business and the financial situation as regarding his ability to stand the litigation, and I believe that I was very closely in touch with everything of importance to the defend-

ant that happened throughout the entire period of the litigation on the Harmatta patent. I am certain that neither Mr. Warren nor anybody else ever intimated to me or to anyone on our side of the case that an honest and successful defense was not desired, and we were never limited or stinted or questioned as to the money spent on the defense. *We made the best defense we could.*

"*Q.* 9. Do you recall any negotiations for a settlement of the Barney & Berry case; and if so, what effect did that have upon the vigor of your defense?

"*A.* Negotiations for a settlement were in the air practically at all times. Mr. Warren, Mr. McBerty and representatives of another welder company, I think the Winfield Company, and another concern, Geuder, Paeschke & Fry, I think that is the name of the concern, met me at various times and expressed the thought that was often expressed to me by Mr. Warren, that it would be a good thing for the benefit of the welder industry if a license could be obtained under the Harmatta patent, and at various times we tried to bring that about. Every attempt failed, because generally the Thomson Company wanted too much in the way of royalty, at least more than the others thought they were willing to pay. There was never, however, any thought expressed by anyone that it would be desirable or safe to let the Thomson Company achieve a victory before settlement, because we all felt that if that happened the Thomson Company would either keep the field to itself or exact a prohibitive royalty and none of us felt like taking that chance. Certainly the possibility of a settlement never in the slightest degree diminished our effort to defeat the patent in the trial of the case. We did hope that a trial could be avoided, but never

for a moment allowed that thought to interfere with our preparation of the defense."

Judge Dodge in the District Court held that the Harmatta patent was invalid. This fact alone should be a complete answer to the scandalous charge that the parties conspired to sustain the patent.

As is so often the case, there had been negotiations for a settlement before the trial in the District Court in April, 1914. They came to nothing and did not affect the strictly adversary character of that trial. There is no evidence or assertion on behalf of defendant that after the trial which was in 1914, until the final decision of the courts of the First Circuit in 1916, there were any negotiations between the parties.

The purchase of the assets of the Toledo Company by the Thomson Company in 1916 after the final decision in the Barney & Berry case was the natural result of that decision holding valid the Harmatta patent in suit and ordering an injunction and account. The circumstances and negotiations which led up to that purchase are given by Mr. Farley, the present president of the Thomson Company, called as a witness by the defendant (Vol. II, pp. 809–814). The purchase was a transaction which was entered into upon at Mr. Farley's initiative, and it signalized and accompanied a change of policy on the part of the Thomson Company, which followed upon Mr. Farley's becoming president of that company in the summer of 1916.

Mr. Farley, as he testifies, had never even heard of the Thomson Company until the summer of 1916, and much less had he any knowledge of the Barney & Berry suit or of any previous negotiations with the Toledo Company for a settlement of that suit (Vol. II, p. 807). Upon acquiring stock control and becoming president of this com-

pany in 1916, Mr. Farley found it tied up by a contract with the Universal Company which put the sale of the spot welding machines entirely within the control of the Universal Company, the Thomson Company's only interest in the matter being in royalties; the new management concluded that the Thomson Company itself should undertake the manufacture and sale of the machines. But if this policy was to be pursued the Thomson Company would have to make a new arrangement with the Universal Company and would also have to acquire manufacturing facilities which it did not then have. As the Toledo Company did have such facilities, and the stoppage of its manufacture of spot welding machines would in the ordinary course of events soon follow the decision in the Barney & Berry case, the defense of which the Toledo Company had openly assumed, it was logical and obviously desirable for the Thomson Company, if possible, to obtain these manufacturing facilities. Accordingly, Mr. Farley opened negotiations both with the Universal Company to cancel the contract with that company, and with the Toledo Company to buy its plant and settle the litigation with it without an accounting. The negotiations were carried along simultaneously, one being dependent upon the other. Mr. Farley first got a 30-day option from the Toledo Company for the purchase of its plant. This was on November 2, 1916. He then made his contract with the Universal Company, giving that company stock in the new company to be formed (the plaintiff herein) to take over the spot welding business, and not until he had agreed with the Universal Company was he willing to take up the option with the Toledo Company, which he did later in November, 1916.

On the same date on which the Toledo Company's contract was signed, the Thomson Company made a separate contract with Mr. Warren, the general manager of the Toledo Company, by which it retained his services,

because of the advantage which his good-will with his customers would give and because it was believed that he could be of assistance to the Thomson Company in making settlements for royalties on account of infringing machines then in use.

The dealings with the Toledo Company and with Warren in November, 1916, had absolutely nothing to do with anything that had gone before, and were entered into at that time purely because it then seemed to the officers of the Thomson Company advantageous for them to obtain the manufacturing facilities of the Toledo Company and to have the services of Mr. Warren.

The defense in the Barney & Berry case was conducted by counsel of the highest reputation, experience and ability, who were unstinted in expense. Every point was contested, and none that gave promise was overlooked or neglected, and the case was actually won by the defense in the District Court. The decision of the Court of Appeals for the First Circuit sustaining the Harmatta patent in suit in that case is entitled to the full respect of this Court.

CONCLUSION.

For the foregoing reasons it is respectfully submitted that the decree of the Circuit Court of Appeals for the Sixth Circuit affirming the decree of the District Court dismissing the bill of complaint should be reversed and the cause remanded to said Courts with instructions to enter a decree for the plaintiff, holding the Harmatta patent in suit valid and infringed and ordering an injunction and an accounting as prayed for by the bill of complaint and awarding to the plaintiff its costs of suit.

FREDERICK P. FISH,
J. L. STACKPOLE,
H. F. LYMAN,
of Counsel for Plaintiff-Petitioner.

Office Supreme Court
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WM. R. STANSBURY
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IN THE

Supreme Court of the United States

OCTOBER TERM, 1923, No. 120.

THOMSON SPOT WELDER COMPANY,
PETITIONER,

vs.

FORD MOTOR COMPANY, DEFENDANT-
RESPONDENT.

BRIEF FOR RESPONDENT

MELVILLE CHURCH,
Counsel for Respondent.

PRESS OF BYRON S. ADAMS, WASHINGTON, D. C.

SUBJECT-MATTER INDEX.

	Page
Opening Statement	1
The Art of Electric Welding	8
Thomson Fundamental Patents Nos. 347,140 and 347,141	10
Thomson Patent No. 396,015	13
Thomson Patent No. 444,928	16
Lemp Patent No. 553,923	21
Thomson Patent No. 496,019	22
Robinson Patent No. 574,942	32
Kleinschmidt Patent No. 616,436	34
Burton Patent No. 647,694	35
Perry Patent No. 670,808	37
Parkinson British Patent No. 14,536 of 1894	39
de Ferranti British Patent No. 11,921 of 1903	40
Benardos German Patent No. 50,909	41
Stanley U. S. Patent No. 1,176,614	45
Graphic Comparison of Harmatta Disclosure With Prior Art (Folder)	46
Application of Electric Resistance Welding here in Controversy was Never Patentable to Harmatta	47
Process Distinguished from Apparatus	49
All of the Process or Method Claims of Harmatta are Anticipated and Void	55
Plaintiff's Abortive Efforts to Distinguish between Harmatta's Process and Those of the Prior Art	60
Roller Electrodes and Pin Electrodes	60
Thickness of Plates or Parts Operated Upon	63
Character of Current	66
Electrode Materials	66
Graphic Comparison of Electrode Materials and Materials Operated Upon of Harmatta with those of Prior Art (Folder)	67
Materials to be United By Welding	68

Page

Extrusion of Metal 72
Because of Breadth of Harmatta Product Claims they are Anticipated by Patents of Robinson, Benardos and Others 79
By the Conduct of its Predecessor, Plaintiff is Estopped to Assert Harmatta's Priority Over Rietzel. 84
Plaintiff's Conduct Resulted in Securing Monopoly to Plaintiff of Over Twenty Years Instead of Seventeen Years. 109
Defendant Practiced Spot Welding Before Issue of Harmatta Patent and During the *status quo anti*. 111
The Law of Equitable Estoppel..... 111
The Commissioner of Patents is Regarded as the Representative of the Public..... 116
Rietzel did Actually Electrically Weld Plane-Faced Plates in Spots in 1898..... 123
What Harmatta Thought He Had Invented and What He Sought to Patent..... 129
The Harmatta Patent 142
The New Matter Inserted in the Harmatta Patent 144
The Product or Article Claims of the Harmatta Patent are Invalid Because of New Matter Never Sworn to by Harmatta to be of His Invention. 148
The Product or Article Claimed by Harmatta is Indistinguishable from that Claimed by Rietzel, and Plaintiff is Estopped to Contend to the Contrary 151
The Prior Invention of Sebastian Z. de Ferranti.. 152
The Decision of the Court of Appeals in de Ferranti vs. Harmatta 164
de Ferranti First Claimed Substance of Issues Involved in de Ferranti vs. Harmatta, December 6, 1910 164
The Bearing of Chapman & Chapman vs. Wintroath, 252 U. S., 126, on the Harmatta Patent as a Whole 168

Page

The Prior Suit on the Harmatta Patent Against Barney & Berry, Inc., was Feebly Defended and Ought not be Given But Little, if Any Weight. . . . 169
Judge Dodge's Decision 174
The Decision of the Court of Appeals for the First Circuit. . . . 176
The Process of Spot Welding, So-Called, of Harmatta is but a Normal and Expected Application of Electric Resistance Welding and Involves Nothing Patentable 178
The Enormous Commercial Development of Spot Welding is Not Attributable to Harmatta. . . . 183
Spot Welding by Mr. F. P. McBerty in 1901. . . . 188
Fred P. McBerty 195
Major Edward B. Craft 204
Jasper W. Powers 206
John S. Gilder 208
Evrah C. Lipps 209
John A. McDonald 210
Capt. William E. Smith. . . . 212
Mr. McElray. . . . 214
Albertus C. Taylor 215
Fred. G. Carter 216
William B. Ensor 216
John B. Estabrook 218
Plaintiff's Unsuccessful Attempts to Answer the McBerty Defense 218
Conclusiveness of the Findings of Fact by a Trial Judge. . . . 229
Supreme Court Cases 230
Circuit Court of Appeals Cases. . . . 231
Sixth Circuit. . . . 233
Conclusions. . . . 239

TABLE OF CASES CITED.

	Page
Adamson vs. Gilliland, 242 U. S., 350	230
Aetna Co. vs. Davidson Co., 257 Fed., 68	235
American Lava Co. vs. Steward, 155 Fed., 731	150
Bain vs. White, 256 Fed., 428	232
Barber Co. vs. Brown Co., 258 Fed., 1	233
Blettner vs. Gill, 251 Fed., 81	235
Bromley Co. vs. Stewart, 51 Fed., 912	181
Brookheim vs. Greenbaum, 225 Fed., 763	231
Brush vs. Condit, 132 U. S., 39	189, 227
Burt vs. Coats & Cameron, 47 App. D. C., 185	159
Carey vs. Donohue, 209 Fed., 328	234
Chautauqua Institute vs. Zimmerman, 233 Fed., 371	234
Chapman & Chapman vs. Wintroath, 252 U. S., 126	164, 168
City of Toledo vs. Toledo Co., 259 Fed., 450	234
Coffin vs. Ogden, 18 Wall. 120	189, 227
Deister Co. vs. Deister Mach. Co., 263 Fed., 706	235
Diamond Co. vs. Webster Bros., 249 Fed., 155	238
Dooley vs. Pease, 180 U. S., 126	230
Eachus vs. Broomall, 115 O. G., 429	150
Egbert vs. Lipman, 104 U. S., 333	189, 226
Elliott vs. Peet, 202 Fed., 434	232
Elliott & Co. vs. Youngstown Co., 181 Fed., 345	181
Escanaba Co. vs. Burns, 257 Fed., 898	233
Estep vs. Kentland Co., 239 Fed., 617	235
Expanded Metal Co. vs. Bradford, 214 U. S., 366	49
Fed. Co. vs. Pick & Co., 251 Fed., 894	236
Ferranti vs. Lindmark, 30 App. D. C., 417	159
Fried. Krupp Aktien-Gesellshaft vs. Midvale Steel Co., 191 Fed., 588	117
Fuller vs. Reed, 249 Fed., 158	231
Grant vs. Raymond, 6 Peters, 217	117
Hamlin vs. Grogan, 257 Fed., 59	236
Haslem vs. Pittsburgh Glass Co., 68 Fed., 479	181
Hathaway vs. First Nat. Bank, 134 U. S., 494	230
Hathaway vs. Ford Motor Co., 264 Fed., 952	238

Page
Jay vs. Weinberg, 250 Fed., 469 159
Kephart, *Ex Parte*, 1903 C. D., 137 116
King vs. Weiss Co., 266 Fed., 257 233
Lake Erie Co. vs. Schneider, 257 Fed., 675 233
Leggat vs. M'Lure, 234 Fed., 620 239
Lillie, *Ex Parte*, 53 O. G., 2041 140
McKeithan Co. vs. Fidelity Co., 256 Fed., 428 232
Nashville Co. vs. Barnum, 212 Fed., 634 231
National Surety Co. vs. Globe Co., 256 Fed., 601 .. 238
National Tube Co. vs. Spang, 135 Fed., 22 181
N. Y. Belting Co. vs. Sibley, 15 Fed., 386 117
Nichols vs. Elkins, 225 Fed., 689 238
Pierce vs. Dock Co., 265 Fed., 148 231
Powder Co. vs. Powder Works, 98 U. S., 126 150
Pugh vs. Snodgrass, 209 Fed., 325 234
Railroad Supply Co. vs. Hart Co., 222 Fed., 274 .. 116
Rowntree vs. Sloan, 45 App. D. C., 207 164
Steward vs. American Lava Co., 215 U. S., 161 151
Thomson Electric Weld. Co. vs. Barney and Berry Co., 227 Fed., 428 ..... 2, 170, 183
Turner vs. Schaeffer, 249 Fed., 654 233
Tyng vs. Grinnell, 92 U. S., 467 230
Union Mfg. Co. vs. Lounsbury, 24 Fed. Cases 587 .. 118
U. S. vs. Fidelity Co., 236 U. S., 512 230
U. S. vs. Marshall, 210 Fed., 595 237
U. S. Mineral Wool Co. vs. Manville Co., 125 Fed., 770 ..... 189, 228
Virginia Co. vs. Charles, 254 Fed., 379 232
Washington Co. vs. Murray, 211 Fed., 440 232
Wear vs. Imperial Co., 224 Fed., 60 238
Weld vs. McKay, 218 Fed., 807 236
Winter vs. Bostwick, 212 Fed., 884 235
Winter & Eichberg vs. Latour, 25 App. D. C., 415 .. 159
Wiscart vs. D'Anchy, 3 How., 320 230

IN THE

Supreme Court of the United States

THOMSON SPOT WELDER COMPANY, PLAINTIFF-PETITIONER,

vs.

FORD MOTOR COMPANY, DEFENDANT-RESPONDENT.

BRIEF FOR RESPONDENT

This is a suit in equity brought by Thomson Spot Welder Company, a Massachusetts corporation, plaintiff-petitioner (hereinafter referred to as plaintiff) against Ford Motor Company, a corporation of Michigan, defendant-respondent (hereinafter referred to as defendant) for the infringement of letters patent No. 1,046,066, granted December 3, 1912 (upon an application filed just nine years earlier, namely, on December 3, 1903), to Johann Harmatta, of the Kingdom of Hungary, assignor to Thomson Electric Welding Company, the predecessor of the plaintiff, for improvements in Electric Welding.

The Harmatta patent has once before been in litigation, namely, in a suit brought March 13, 1913, in the United States District Court, for the District of Massachusetts, by Thomson Electric Welding Company,

et al., against Barney & Berry, Inc. In that suit the patent was held invalid by the District Court, presided over by the Honorable Frederic Dodge, Circuit Judge; but, on appeal, Judge Dodge was reversed and the patent sustained. Both the opinion of Judge Dodge and the opinion of Judge Putnam, speaking for the Circuit Court of Appeals for the First Circuit, are reported in 227 Fed. 428. Barney & Berry, Inc., was only the nominal defendant in that case, the real defendant being The Toledo Electric Welding Company, of Toledo, Ohio, the manufacturer and seller of a machine of whose use by Barney & Berry, Inc., complaint was made.

After the decision of the Court of Appeals of the First Circuit, the present plaintiff, Thomson Spot Welder Company, was organized to carry on the spot welding business of the Thomson Electric Welding Company, and proceeded to attempt to impose upon the manufacturers and users of electric spot welding machines a very onerous licensing scheme, requiring, among other things, the payment of a royalty of $250, each year, per machine, and also an acknowledgment of the validity of the Harmatta patent.

The manufacture and sale to the public of spot welding machines, by others than Thomson Electric Welding Company, began as early as the year 1908, or more than four years before the Harmatta patent was granted, and as the use of metal as a substitute for wood increased by leaps and bounds, the availability of electric welding for the union of metal sheets and other metal parts became more and more appreciated, until it came to pass that almost every factory contained as a part of its equipment one or more spot welding machines. The attempt, therefore, of the

plaintiff to hold up the users of spot welders under the Harmatta patent raised such a storm of protest throughout the country, that an organization was finally formed called "The Welding Patents Investigating Committee," with a view to determining, first, the true position of Harmatta in the electric welding art, and secondly, to ascertaining whether the suit against Barney & Berry, Inc., had been adequately defended, or only defended in such a partial and half-hearted manner as was thought by the parties would result in the sustaining of the patent. Over four hundred of the makers and users of spot welding machines became contributors to a fund to carry on the work of this committee with the understanding that any contributor might avail himself of the materials of defense which the committee might gather. (See Defendant's Exhibit Bulletin, No. 21, July 17, 1917, offered at page 1001.)

The plaintiff itself realizing the weakness of its position, notwithstanding the adjudication of its patent, for a time adopted the policy of attempting by threats to extend its licensing field and of not risking the bringing of any suit outside of the First Circuit, until it finally discovered that there was such an increasing and general disregard of the patent as to require it to be further litigated, as the only chance of rendering it further profitable. The present suit, instituted December 1, 1917, over two years after the adjudication of the Court of Appeals in the Massachusetts case, represents the first attempt to judicially enforce the patent outside the First Circuit.

Notwithstanding its contribution of funds to the Welding Patents Investigating Committee, for the gathering of materials of defense, the defendant herein

has undertaken, at its own expense and without contribution from the committee or any of its members, to alone bear the whole burden of the defense of this case.

The very large record that is now presented to the Court for consideration represents, in part, defendant's efforts to enlighten the Court and to guide it to a correct conclusion as to the merit, or lack of merit, of Harmatta's contribution to the electric welding art.

It is believed that the record shows, among other things:

(a) That plaintiff's exploitation of the Harmatta patent represents but one effort, among many, on the part of plaintiff and its predecessor, to maintain their dominance in the electric welding art, notwithstanding the expiration of the fundamental patents of Thomson and others, covering generically, that art, as well as the specific application of it now called "spot welding."

(b) That plaintiff's predecessor made a prior notable attempt to control so-called spot welding through a patent granted to it in 1909 as the assignee of one Adolph Rietzel, one of its employees, and then after that patent had been used for over three years as the foundation of a licensing system and as a club to enforce the payment of tribute by users of spot welders, procured through purchase, the Harmatta United States application and transferred to that application all the broad generic claims of the Rietzel patent and took a new patent running in the name of Harmatta, which extended the plaintiff's monopoly seventeen years longer, making it twenty years in all.

(c) That Rietzel in his work conceived and reduced to practice two modifications of spot welding, involving in their practice the same method of operation and resulting in the production of the same article, namely,—

(1) The spot welding of superposed plates, one or both of which were formed with slight projections for localizing the application of pressure and current at separate or isolated spots; and

(2) The spot welding of plane-faced plates by the application of current and pressure at isolated spots by means of pin electrodes.

(d) That when, during the prosecution of the application for the Rietzel patent, the foreign patents of Harmatta were cited in anticipation of Rietzel, the Thomson Company, through the sworn affidavits of Rietzel, represented to the Commissioner of Patents that Rietzel's invention of both the process of spot welding plates having projections and the process of spot welding plane-faced plates antedated the invention of Harmatta as disclosed in said foreign patents.

(e) That, in an interference in the Patent Office that was ultimately declared between the Rietzel patent, and the U. S. application of Harmatta, the Thomson Company again, through sworn affidavits of Rietzel, represented to the Commissioner of Patents that Rietzel was the prior inventor over Harmatta, and, by virtue of such representation, an immediate judgment of priority against Rietzel was averted, and the Rietzel patent was enabled to be further continued to be used, unaffected, as the basis for the Thomson Company's licensing system and as a menace with which to threaten the public into submission to the Rietzel patent.

(f) That by reason of the representations so made to the Commissioner of Patents, as the representative of the general public, the plaintiff, as the successor in interest of the Thomson Electric Welding Company, is precluded and estopped to deny the priority of Rietzel in this suit against this defendant, a member of such general public.

(g) That, independently of the question of the plaintiff's estoppel to deny the same, Rietzel is shown by the proofs to have been, in fact, the prior inventor over Harmatta.

(h) That Fred P. McBerty, of Warren, Ohio, invented and practiced the so-called method of the Harmatta patent in the year 1901, or nearly three years before the earliest date that can be set up for Harmatta.

(i) That the practical art of spot welding in this country was developed from knowledge derived from the said McBerty's work in 1901, first, by one Albertus C. Taylor, in 1904, at the works of the Winfield Electric Company, at Warren, Ohio, and secondly, by one William E. Smith, in 1905, at the Ohio works of the Carnegie Steel Company, at Youngstown, Ohio.

(j) That Sebastian Ziani de Ferranti, of London, England, was also the prior inventor over Harmatta, of the subject-matter of the Harmatta patent.

(k) That the disclosure of the Harmatta U. S. application, as originally filed, shows no disclosure of anything new, either by way of method or product, in the electric welding art, but that, aside from certain

immaterial details of apparatus not claimed to be embodied in and covered by the Harmatta patent, said Harmatta application discloses nothing that was not well known and that had not been previously disclosed and described in prior patents and publications in this and in foreign countries and particularly in the prior expired patents to Elihu Thomson once owned by plaintiff's predecessor.

(l) That the only kind of metal plates specifically suggested by Harmatta, either in his United States patent or in his foreign patents, as susceptible of being united by his process, i. e., plates of tinned sheet iron (fer-blanc) was the identical kind of plates described by Thomson in his earlier patents which plaintiff now claims do not embody Harmatta's conception.

(m) That the Harmatta U. S. application, as originally filed, discloses nothing distinguishing Harmatta's suggestions from the prior art—

(1) As to the *kind* of metal plates to be united;
(2) As to the *material* of which the *electrodes* employed to apply the pressure and current are constructed;
(3) As to the size of the welds;
(4) As to the amount of pressure required to be applied;
(5) As to the amount of current to be applied; or
(6)As to the time or duration of the application of pressure and current;

(n) That the defense of the Massachusetts suit against Barney & Berry, Inc., was inadequate and partial, and that the evidence regarding the conduct of that case leads to the suspicion, at least, that the

result reached was due to the suppression of defenses known by both sides to be available and to such collusion between the parties to the suit as to deprive the adjudication in that case of any weight or value whatsoever in the determination of the issues in the present suit; and

(o) That, finally, the whole course of conduct of the plaintiff and its predecessors, with respect to the subject of spot welding, has been so unjust and inequitable as to deprive the plaintiff of the right to any relief in a court of equity.

The trial Court saw and heard the fact witnesses who gave testimony in regard to the McBerty defense; saw the McBerty apparatus operated in his presence, and after most careful consideration of the whole case, filed an exhaustive opinion sustaining the majority of defendant's contentions, and ordered the bill dismissed. From the decree entered by the trial Court an appeal was prosecuted to the Circuit Court of Appeals for the Sixth Circuit and the latter Court affirmed the decision below, sustaining specifically the defense of lack of invention, without going into the other defenses of prior invention, prior public use, estoppel, etc., also sustained by the trial Court.

ELECTRIC WELDING

The application of electricity as an aid in the welding together of parts or pieces of metal of various forms and shapes, adapted to various uses, has given rise to a terminology that is quite confusing to a layman and even to an expert.

In the testimony of witnesses given in this case, in

the prior patents relating to electric welding, and in the general literature of the art to which reference has been made, we constantly meet with such expressions as "arc welding," "resistance welding," "spot welding," "point welding," "projection welding," "electrode welding," "roller welding," etc. All these, however, refer to electric welding that may be classified as either, (1) Resistance Welding, or (2) Arc Welding.

In the standard publication of Hamilton & Oberg, entitled, "Electric Welding," these two classes are distinguished as follows (Rec., p. 191):

> "*Different Systems of Electric Welding.*
>
> The principle of electric welding is simple: the parts that are to be welded are heated to a welding temperature by means of an electric current. There are two ways in which the electric current can be utilized for heating to a welding temperature, and according to the methods used, two main processes or systems of electric welding may be distinguished—the electric resistance-welding process and the electric arc-welding process. In the former—the resistance-welding process—the parts to be welded are brought to a welding heat by the passage through them of an electric current of such voltage and amperage that the resistance to the flow of current is great enough to produce sufficient heat *at the points or surfaces to be welded*, so that, when the parts are brought together by a slight pressure, they will be joined by the fusing of the metal, that is, by welding.
>
> In the latter system—the arc-welding method—an electric arc is drawn between the two electrodes or between the work and one electrode. This arc is brought into such a position relative to the work that the heat from the arc melts the metal to be welded, and enables the parts to be united.

> There are various modifications of this latter process, but, in principle, the above description is correct."

This controversy has nothing to do with arc-welding, so we may dismiss from further consideration that sort of welding, simply calling attention to the Benardos & Olszewski U. S. patent No. 363,320 (Rec., p. 1030) as an exemplification of it.

THE THOMSON PATENTS 347,140 (REC., p. 1021) AND 347,141 (REC., p. 1026) OF AUG. 10, 1886

Prof. Elihu Thomson is justly entitled to the distinction of being known and regarded as the father of the art of electric resistance-welding.

On Aug. 10, 1886, he was granted two patents, viz., No. 347,140 and No. 347,141, the former claiming and covering the art or process, of resistance-welding, broadly, and the latter an apparatus for practicing that art.

Referring to the art patent, No. 347,140 (Rec., p. 1021), we find that therein Prof. Thomson, in his statement of invention said (p. 1, line 9, of the patent):

> "My invention consists in a novel art or process of and apparatus for forming joints between metal wires, bars, and the like by the agency of an electric current. This art or process I term 'Electric Welding.'"

Again (p. 1, line 30 of the patent):

> "Briefly, the new art, which I term 'Electric Welding' consists in bringing together with a certain pressure the *ends* of the wires, bars, etc., to be

jointed, and which pressure must be small, and can with my apparatus be regulated at will, and then constituting the abutted ends and a slight portion of the wire or bar on each side of such ends as the path for an electric current of great volume, but not necessarily of an electro motive force of more than a few volts (depending on the nature and size of the wire or bar). * * *

"Either continuous, intermittent or alternating currents of electricity may be employed."

In this art patent, Prof. Thomson illustrated the joining or welding together of various articles, that is to say in Figs. 1, 3 and 4, the *ends* of two round wires; in Fig. 10 the *ends* of two flat plates; in Fig. 11, the *end* of a round shaft to the *end* of a similar short shaft section connected to a flanged head; in Fig. 12, the *end* of a square shaft to the *end* of a smaller round shaft; in Fig. 13, the *ends* of a split ring; in Fig. 14 the *ends* of a split link; in Fig. 15, the *ends* of two light bars to the *end* of a thicker bar. The materials of the parts to be united, Prof. Thomson stated, might be "of copper and its alloys, iron, silver, gold, etc." (p. 1, line 23), or "brass, iron, steel, or German silver" (p. 1, line 96).

The parts to be welded were described as being held by electrodes or clamps (K K′) of good conducting material described in the companion apparatus-patent, 347,141 (Rec., p. 1026), as "of copper or other good conductor" (p. 1, line 76).

Some significance attaches to the fact that Prof. Thomson thus, in the early days, mentioned the practicability of electrically welding by his process sections of copper or of silver, as well as sections of iron, since it goes to show the thoroughness of his investigations and his full appreciation of the scope of his discovery at that time.

According to the tables issued by the Smithsonian Institute (Rec., p. 588), the resistivity of copper is 1.586, that of silver, 1.46, and that of iron, 8.85. Consequently, where Prof. Thomson used copper electrodes or clamps for the welding of iron pieces, his electrodes were of *lower* resistance than the work itself; where they were used for the welding of copper pieces they were of the *same* resistance as the work; and where they were used for the welding of silver pieces, they were of *greater* resistance than the work.

Throughout his art-patent, Prof. Thomson laid particular stress on the presence of pressure and fusing current *at the joint or point of contact between the articles being welded*, as constituting the gist and essence of his discovery. This is emphasized, for instance, in claim 1 of the patent:

> "1. The herein-described art of effecting union between two pieces of metal, consisting in holding the same in contact *at the point of union* and simultaneously passing a current of electricity through the *joint* of a power to fuse and unite the pieces, as and for the purpose described."

The desirability of having clean the contacting surfaces to be united and of the wisdom of employing in some cases a flux to better the union, was also fully appreciated.

Thus, the patent states (p. 2, line 35):

> "Of course, it is important that the wires shall be clean to insure contact, and though usually the joint is well formed without any flux, such as borax, there is no objection to its use in slight amount in certain cases. In such cases, after abutting the wires, a little moist powdered borax or other flux may be applied at J (the joint)."

(See Mr. Dyer's discussion of these patents, Rec., p. 548, *et seq*).

THE THOMSON PATENT NO. 396,015 OF JAN. 8, 1889 (REC., p. 1037).

On Jan. 8, 1889, Prof. Thomson took another patent, No. 396,015, in which he disclosed an application of resistance-welding for uniting the proximate contacting plane surfaces of overlapped *flat plates*, in contradistinction to uniting the *end surfaces* of plates, bars or rods, as described specifically in his original art-patent, No. 347,140, just considered.

This application of resistance-welding by Prof. Thomson to the welding together of the *proximate contact surfaces of flat plates* was, it is true, incidental to the main purpose he had in mind when he devised the method and apparatus disclosed in this patent 396,015. Such main purpose was to fuse and upset, by the simultaneous application of pressure and an electric weld welding current, ordinary metal rivet blanks applied through openings in overlapped metal plates. Prof. Thomson proposed that, instead of pre-heating rivets in the usual manner, and passing them, while hot through the plates to be united, and then heading them up, he would heat the rivets *in situ* by means of the electric current and upset them by the pressure of the same electrodes that fed the current to them. But in developing this idea, it occurred to him, quite naturally, that not only could the current be utilized to soften and upset the rivets, but could also be utilized to weld the surface of the body of the rivets to the surface of the walls of the rivet holes in the plates; and it then, also quite naturally, further occurred to him that he could, by the use of a proper form of electrode, pass

the welding current *directly through* the *plates themselves* and weld the *proximate faces of such plates together,* so that he would have an exceedingly firm connection between the superposed or overlapped plates, consisting, first, of the upset rivets; secondly, of the weld between the rivets and the walls of the rivet holes, and, thirdly, of welds *directly formed between the plates themselves at points more or less remote from the rivets and rivet holes.*

The patent states (p. 1, line 17):

> "In carrying out my invention I may swage or form both heads after the heating of the rivet-blank in position in the work, or may swage or form one head only, the rivet having been inserted with one head ready formed.
>
> "The heating of the rivet when in position may be carried only to the point sufficient to permit it to be set by swaging or heading its ends, or the current may be allowed to pass for a longer period and until the central portion of the rivet, as well as the metal near thereto, is raised to a welding temperature, when the application of pressure expanding the rivet in its seat will weld the same to the metal surrounding it, and the application of pressure to the pieces to be riveted will weld them together around the rivet.
>
> "*In some cases, I may cause the electric current to flow across from piece to piece of the parts to be riveted, as well as through the rivet itself.*"

Modified forms of apparatus by means of which the electrodes were caused to pass current through the plates themselves, to *thus cause welds to be formed between the proximate plane surfaces of the plates,* were shown in Figs. 9 and 10 of the drawings of the patent and were described in the specification of the patent

(p. 2, lines 50 to 87), and two illustrations of welds thus formed were portrayed in Figs. 6 and 7 of the patent drawings.

Mr. Dyer, defendant's expert, very lucidly analyzes this Thomson patent, No. 396,015 (Rec., pp. 548-551), and Prof. Thomson himself, when called as a witness for defendant, admitted, though reluctantly, that the patent disclosed the welding together of the plates themselves, face to face, in addition to the upsetting or welding in of the rivets passing through the plates, and that the patent claimed the method involving this. He was asked (Rec., p. 532):

> "Q. 26. Is not the idea of welding the plates themselves together, also given expression in the sixth claim of this patent, which reads as follows:
>
> '6. The herein described method of fastening two pieces of metal together, consisting in passing a heating electric current through a rivet or rivet blank passing through the pieces, *as well as through the pieces of metal themselves* in the neighborhood of the rivet, and applying pressure to set the rivet and weld the pieces together?'
>
> "A. Undoubtedly that is one of the objects of the patent, as clearly shown in Figs. 6 and 7, not only to heat the rivets, but in some cases to allow the current to heat the plates so that they might be involved with the rivet in a weld."

This answer well illustrates how self-interest will induce a witness of even Prof. Thomson's caliber to equivocate and attempt to mislead. By his adroit reference to Figs. 6 and 7 Prof. Thomson sought to give the impression that claim 6 refers to the practice

represented by those figures, but when we come to look at the specification of the patent for a description of those figures we find that the plates of those figures are heated by conduction of heat from the current-heated rivets and not by the passage of the current directly through the plates themselves, as called for by the claim.

THE THOMSON PATENT 444,928 OF JAN. 20, 1891 (REC., p. 1047).

Another application of electric resistance-welding is found disclosed in Prof. Thomson's patent No. 444,928, dated Jan. 20, 1891 (Rec., p. 1047).

There is no doubt about the purpose of the invention of this patent being to unite plane sheets of metal, face to face, by pressure and an electric welding current applied to the sheets to be united, the pressure being applied to the work through the electrodes that feed the current to the work, and *the welds being formed between the contacting faces of the work at the point of pressure, only.*

The patent states (p. 1, line 15):

> "My present invention relates more particularly to the process, of joining or welding together strips, sheets, plates, or bars of metal where it is desirable to form a joint of considerable length, and is especially applicable to the welding of plates together at their edges, *instead of riveting,* to the welding of ribs or strips of metals to plates for the purposes of strengthening the same, to the formation of pipes by welding a longitudinal joint, to the welding of half-round or other shaped strips on one or both sides of a plate or strip of metal, and to other similar classes of work, as will be obvious.

"My present invention consists essentially, of forming an elongated joint by the electric welding process by feeding the work in the longitudinal direction of the joint through suitable pressure devices, the work being properly arranged so that the pressure devices will press the surfaces to be welded together, and simultaneously passing an electric current through the work at the point of pressure."

The specific means disclosed as suitable to be employed in the practice of the application of electric resistance-welding disclosed by this patent were two roller electrodes (Figs. 1 and 3) or two electrode segments (Fig. 2), of good conducting material, means for pressing the rollers or segments toward each other so as to clamp between them, face to face, the plates to be united, and means for supplying a suitable welding current to the electrode rollers or segments.

The patent states (p. 1 line 66):

"The frames F F' being of conducting material, may be connected with any suitable source of electric current of large volume through cables C, C, or by other means, so that an electric current may be caused to pass from one roll to the other, and *through any pieces of conducting material held between them in pressure contact.*"

After thus stating that the current may be passed through *any pieces of conducting material held between* the rolls, the specification goes on to describe the specific application of the process shown in Fig. 1, wherein two plates, *overlapped near their edges,* are portrayed as being operated upon by two electrode rollers R. R'.

The specification states (p. 1, line 84):

> "The edges are slightly *overlapped,* as shown, and the plates, being in position between the rolls, may be squeezed together by means of the screw S, thus forming an electric contact between them. The electric current being now turned on as it passes from one roller to the other and across the *point of pressure* will heat the work to the welding temperature and soften the same slightly, after which the screw may be given a few more turns to effect a solid union."

So far, the specification has certainly described a typical instance of the welding together, face to face, of two flat metal plates by means of two current-feeding roller-electrodes applied with pressure to the backs of the plates, the plates being first squeezed together by the rollers to make a good contact between them, then subjected to the action of the welding current at the "point of pressure" between the two plates, and, then, further squeezed "to effect a solid union" of the plates at that point.

Whether the contacting surfaces of the roller-electrodes are, initially, at the extreme end of the overlapped plates, or slightly distant, or greatly distant, therefrom, the specification does not state, but whether at one place or the other is wholly immaterial. Whenever the roller-electrodes press upon the interposed plates, and current passes, they produce, inevitably, a welding of the proximate contacting surfaces of the plates, at an isolated spot, and each time the rollers are opened, the work fed and the rollers closed again, another weld, at another spot, is produced.

After describing the production of the preliminary weld, the specification of the patent goes on to tell us how a continuous seam may be welded, as follows (p. 1, line 94):

"The work, *having been thus started,* may now be moved along through or between the rollers, so as to bring *successive parts of the joint* into position to be pressed and heated at the same time.* By this operation the metal will become thoroughly united as it passes through and out between the rolls. It is obvious that the speed of the operation may be varied by varying the rate of heating and the rapidity at which the work may be fed through the rolls."

It is evident that Prof. Thomson thought he had made at least two advances in the art of resistance-welding by the disclosures of this patent, No. 444,928, namely, (1) broadly the union of two *overlapped plates* or pieces, *face to face,* at a spot, as distinguished from the union of two plates *end to end,* or abutted after the manner of his earlier patent No. 347,140, and (2) the union of two overlapped plates by a continuous seam.

The first, or broader invention, as expressed in the second claim of the patent, covers the making of the initial weld described by him preliminary to the production of a continuous seam, as follows:

"2. The herein-described improvement in forming electrically-welded joints, consisting in *lapping* the pieces to be welded upon one another, passing the lapped pieces through or between *suitable pressure devices forming the electrodes* of an electric heating circuit, and applying pressure to effect the weld."

This claim, it will be observed, is not limited to the use of roller electrodes, *any* "suitable pressure devices

*NOTE: Compare the statement in the original Harmatta specification respecting the action of his roller-electrode apparatus, i. e., "the pressure being exerted by roller-electrodes whereby *the advancing series of single points of the seam* to be welded is united to a whole with a minimum consumption of current" (Rec., p. 1358).

forming the electrodes of an electric heating circuit" being within its ambit; nor is it limited to the passing of the lapped pieces through the pressure devices, the insertion of such pieces *between* such pressure devices, in any way, being equally covered by it.

The narrower invention is covered by claims 1 and 3 of the patent, the former including the use of *any kind* of electrodes employed as "pressure devices," and the latter the use of *roller-electrodes* only.

Said claims read as follows:

> "1. The herein-described method of forming an elongated joint by the electric welding process, consisting in feeding the work in the longitudinal direction of the joint through *suitable pressure devices*, while properly arranged so that the pressure devices will press the surfaces to be welded against one another, and simultaneously passing an electric current through the work at the point of pressure.
>
> * * * * * * *
>
> "3. The herein-described improvement in forming longitudinal seams or joints between strips or pieces of metal, consisting in feeding the strips or pieces through *suitable rolls*, while arranged in proper position to be pressed together by such rolls, and at the same time passing a heating electric current from one roll to another and through the surfaces to be welded, as and for the purpose described."

Before leaving this patent, we would again call attention to the fact that its disclosures afford other examples of a process of resistance-welding in which the electrodes, being of high conductivity, offer a relatively low resistance to the passage of the current as compared with the resistance offered to the passage of the

current by the plates themselves and by the joint between the contact surfaces of the plates, thereby resulting in the generation of the requisite degree of heat, *at such contact surfaces,* to raise the same to the proper welding temperature.

A more extended discussion of the disclosure of this patent will be found in the testimony of Mr. Dyer, defendant's expert (Rec., pp. 551, 575, 582, 586, 597).*

THE LEMP PATENT NO. 553,923 OF FEB. 4, 1896 (REC., p. 1065).

A hypercritical comment has been made by plaintiff's experts upon the disclosure of the Thomson patent No. 444,928, last above considered, to the effect that the contact face of the roller-electrodes illustrated in Fig. 1 of the drawing of that patent are shown as extending clear across the lapped portions of the metal plates being operated upon, thus necessitating the making of a line contact between the plates from edge to edge of such lapped portions.

This criticism is, of course, entirely without force, as it cannot possibly affect the essential nature of the process whether the plates are brought into line contact across the whole or a part only of the width of the overlapped parts; but, at all events, the criticism, if there were anything in it, is fully met by the disclosure of patent No. 553,923, granted Feb. 4, 1896, to Herman Lemp,—a collaborator of Prof. Thomson's,—wherein, in Fig. 2, is shown what purports to be an exemplification of the previous Thomson invention, in which the pair of roller-electrodes *do not,* in their posi-

*NOTE: In the Barney & Berry suit Judge Dodge held this Thomson patent No. 444,928 to be an anticipation of the Harmatta patent.

tion of operation upon overlapped or superposed plates, extend way across the overlapped or superposed parts, *but only part way across.*

(See Mr. Dyer's discussion of this patent, Rec., pp. 552, 587, 599.)

THE THOMSON PATENT 496,019 OF APRIL 25, 1893 (REC., p. 1053).

In the early days of resistance-welding, Prof. Thomson was keenly alive to many and varied applications of it. In his lucubrations upon the subject he came to realize that he could unite by means of pressure and the electric current metal plates that were coated with a metal of lower fusibility than the plates themselves, as, for instance, plates of iron coated with tin. He evidently reasoned that if he could fuse or weld together the contact faces of thin iron plates themselves, as in his patent 444,928, he ought to be able to fuse or weld together the contact faces of such plates when surfaced with tin—a metal of higher resistivity though of lower fusibility than iron. See Table of Smithsonian Institution. (Rec., pp. 588, 589.)

He, accordingly, devised apparatus for carrying this idea into practice and disclosed the same in his patent No. 496,019, dated April 25, 1893.

In that patent he showed two ways of applying the resistance process in this new field, namely, one in which the tinned plates to be united were pressed together by electrodes of *iron or other metal* having a *lower resistance* than that of tin (the resistivity of iron being 8.85 and that of tin 13.0, Rec., p. 588), which would cause the fusing or welding temperature to be developed by the current, in greatest degree, in the tin coatings and at the joint between the inner con-

tacting surfaces of the coated plates; and the other, in which the tinned plates were pressed together by electrodes *faced with hard carbon,* which latter is a substance of *enormously greater resistance* than tin (the resistance of carbon being 720, while that of tin is as we have seen, but 13.0. Rec., p. 589), which would cause the heat developed at the joint to be supplemented by the heat developed by the resistance of the carbon faces of the pressure electrodes *at the backs of the plates,* such supplemental heat being transmitted, by conduction, through the plates to the inner faces or joint to be united.

In other words, Prof. Thomson found that in dealing with a metal of such high resistivity and low fusibility as tin he could, by the electric current, create heat sufficient to bring the tin to a fusing or welding temperature either (1) by using pressure electrodes of relatively *low* resistance (such as iron) and thereby develop the requisite temperatures *between the contact faces of the plates directly, at the joint,* or (2) by using pressure electrodes of relatively high resistance (such as carbon) to supplement the heat developed by the resistance of the joint by heat developed by the resistance electrodes at the backs of the plates, remote from the joint, and thus cause a proper fusion and union of the tinned faces of the parts at the joint.

In Figs. 4, 5 and 6 of the drawings of this Thomson patent, P. P′ indicate the tin-coated parts to be united and C C′ represent the pressure-electrodes of iron or other metal by which such parts are firmly pressed together and by which the fusing or welding current is fed to the work, developing, *directly at the joint,* the proper fusing or welding temperature.

Fig. 7 shows the modification in which the pressure

electrodes C. C′ of iron or copper are faced with carbon, as at F F′, so that there will be a large development of heat at the *backs* of the plates, due to the very high resistance of the carbon faces themselves and a transference of that heat *by the conduction of the parts P P′* to the inner tinned contact surfaces of the parts, at the joint.

While the patent does not show any specific means for holding the electrode blocks or pieces C C′ illustrated in Fig. 6, the specification writer, Mr. H. C. Townsend, was careful to state (patent, p. 2, line 10) that:

> "The clamping devices *and the means for regulating or controlling the current* may be such as are described in my prior patents Nos. 347,140, 347,141 and 347,142, or the clamping or pressure devices may be suitably modified, as to the shape of their clamping devices, when found desirable."

Referring to the above-mentioned Thomson patent 347,141, for instance (Rec., p 1026), we find that the clamping devices there shown are lettered K K′ (Figs. 1, 2, 3, 4) and are described as "made of copper or other good conductor" (p. 1, line 76); and that "suitable adjustments of current and elastic pressure are readily made *to suit the size of bars or wires and their conducting power*, so as to fuse or electrically weld them" (p. 2, line 10).

It should be carefully noted that the electrodes C C′ of Fig. 6 of the Thomson patent No. 496,019, now under consideration, are cut away at their end faces like the electrodes shown in Fig. 3 of the Harmatta patent in suit, and, also, that *such end-faces cover less than the whole of the proximate surfaces of the parts P P′ to*

be united, and, therefore, produce a weld that is entirely surrounded by an "area of unwelded union," such as is mentioned in the Harmatta patent (though not in the original Harmatta application).

In the modification of the electrode blocks shown in Fig. 7 of the Thomson patent, the blocks proper are said to be made of steel, or iron, or copper, faced with hard carbon (p. 2, lines 40 to 46); but, as carbon is fragile, the patentee says that he prefers not to use the carbon faces but to make notches or grooves in the faces of the metal blocks themselves so as to "leave only a series of points or ridges projecting" (p. 2, line 60), as shown in Figs. 8, 9 and 10; or, as an alternative construction, he provides the blocks with a series of projecting pins, as shown in Figs. 12 and 13.

Later, with reference to the forms of electrode pressure-blocks shown in Figs. 8 to 13, the patent goes on to state (p. 2, line 76):

> "In all these cases the conduction of heat away from the *pieces* held between the blocks is greatly checked by the form given to the surfaces as described, *and the resistance to the passage of the current at the work is increased* which in itself results in further production of heat at the sheet metal pieces *where pressed up together* between the conducting blocks C. C'."

Now, the merest tyro in this art can see that if the faces of the electrode contacts are thus caused to present a series of separated points, the current will pass through those separated points only, will cause a fusion or welding of the faces of the sheets opposite those points, only, and will leave areas of unwelded union between the areas covered by the points.

In the modification illustrated in Fig. 19 of the patent, there is shown the employment of roller electrodes having serrated co-operating faces. The speification says (p. 2, line 111):

> "The rollers exert pressure while the current heats the thin metal pieces *at successive points* between the rollers."

This heating of the thin metal pieces, at successive points, means, of course, the production of a succession of separated independent welds or unions at those separated points, and it shows clearly that Prof. Thomson had not only, at that early day, worked out the problem of producing a continuous welded seam by the use of smooth roller electrodes as disclosed in his previous patent No. 444,928, but had also developed the idea of forming a discontinuous or interrupted seam wherein the successive welds were separated from each other, *so as to leave areas of no weld between them.*

Coming now, to the last modification illustrated in this patent under consideration, namely, that shown in Figs. 21 and 22, we find there a disclosure of *pin-electrodes* arranged to weld and unite superposed metal plates *at places or spots considerably less in area than the area of the overlapped parts.*

Two views are given of this modified form of apparatus, to-wit, a front elevation (Fig. 21) and a cross-sectional elevation (Fig. 22). The co-operating electrodes are arranged in sets, each set comprising an upper electrode C and a lower electrode C'. These sets of electrodes are arranged vertically in a frame in which they are supported and guided. There is applied to each upper electrode a spiral spring, the stress

of which tends to keep it elevated and there is applied to each lower electrode a similar spring which tends also to keep it elevated. Initially the proximate ends of each pair of electrodes are separated, as shown in the case of the pair at the left of Fig. 21, so that the overlapped plates or parts to be united (shown in the figure as two flat plates) may be inserted between them.

For a further description of this form of apparatus and its mode of operation, we give the patentee's own language, viz. (patent, p. 2, line 115):

> "Fig. 1 shows how in one machine several sets of pressure pieces and current applying blocks may be successively operated, as where many pieces are to be operated upon in a given time. J to J′ is a series of cams on a shaft driven by a pulley D, belted to power. The cams are set to act successively on the plungers C, so as to depress them successively against the action of the springs which raise them. Corresponding lower plungers C′, insulated from the upper ones C, are arranged to be depressed in pinching or clamping the pieces between them. This is shown in Fig. 22, which is a view of one set only of the cams and plungers. I indicates insulation about plunger C′.
>
> After pressure has been exerted to clamp the pieces the continued depression of the plungers by the cam S brings the lower end of C′, at *a*, in contact with a current feeding plate below connected with a conductor K′, from the current source, the other conductor K running to the upper plungers, as C.
>
> The sequence of actions then is as follows:
>
> Pieces are placed between the plungers, pressure is applied by cams S, current passes through the pieces, when the plungers are fully depressed, current is cut off as plungers begin to rise, and

finally the pieces are released as the cam completes its revolution.

These actions occur respectively at different times with the different sets of plungers."

Here, then, we have, in this patent No. 496,019, disclosed, as the invention of the great Elihu Thomson—the father of the art of electric welding—the welding together, by pressure and electric current, of plates of tinned iron (*fer blanc*)—the only metal specifically mentioned anywhere in the various disclosures of Harmatta's work as intended to be acted upon by his process as we shall presently see—in five different ways, namely:

(a) By the use of electrodes (iron or other metal) of *lower* resistivity than the plates, so as to cause the maximum resistance, and, consequently, the greatest heating effect, to be developed *in the plates themselves and at the joints between the plates.**

(b) By the use of electrodes (iron or steel or copper, faced with carbon) of *higher* resistivity than the plates, so as to cause a greater resistance, and, consequently, a greater heating effect, to be developed in the electrodes *at the backs of the plates* and the transference, by conduction, of such heat through the plates to the joint to be there added to the heat developed by the resistance of the plates themselves and by the resistance to the passage of the current from plate to plate at the joint.

(c) By the use of electrodes (iron or other metal) of *lower* resistivity than the plates, provided with small,

*Mr. Gravell, plaintiff's expert, admits that where tools or electrodes of relatively good conductivity are used the resistance to the passage of current from electrodes to plates is relatively small, while the resistance of the plates themselves and between the plates, at the joint, contributes most to the generation of the necessary welding heat (Rec., p. 79).

separated projections through which the welding current is applied, at separated localized spots, to produce isolated welds, with areas of no union between them.

(d) By the use of (iron) roller electrodes, of lower resistivity than the plates, such rollers, having peripheral serrations or teeth which conduct the current to the work at separate successive points and, by thus localizing the heat, producing isolated welds with areas of no weld between.

(e) By the use of opposed pin (iron or other metal) electrodes of lower resistivity than the plates, having contact areas less than the areas of the overlapped plates acted upon, so as to localize the current *at spots* and make welds that are isolated and surrounded by areas of no weld.

In all these applications, the electrodes first clamp the plates with pressure, then the current is turned on, and then turned off, after which the pressure is relieved, all as described in the Harmatta patent.

The Thomson patent states that (p. 2, line 10):

> "The clamping devices and the means for regulating or controlling the current may be such as are described in my prior patents Nos. 347,140, 347,141 and 347,142."

The amount of current and the duration of contact and pressure are thus entirely within the control of the operator.

In regard to the character of the plates intended to be operated upon, the Thomson patent says (p. 3, line 12):

> "My present invention is especially applicable to use in uniting thin metals such as *tin plates*

without solder other than the tin on the surfaces, or with solder when found desirable."*

These and the other disclosures of the patent are discussed at length by Mr. Dyer, defendant's expert (Rec. pp. 553, *et seq.*, 575).

We would note, in passing, that while plaintiff's experts attempt to draw a distinction, in principle, between electric welding, electric brazing, and electric soldering, such distinction cannot be maintained, as shown by the following question and answer found in Mr. Dyer's deposition (Rec., p. 599):

"X-Q. 148. Do you recognize a well defined difference in principle between electric welding by what is sometimes called the electric resistance process, wherein the pieces are brought to welding temperature by the development of internal heat in them and an electric soldering process such as is described in the Thomson patent No. 496,-019?

A. No. I recognize no distinction in principle between the two, but regard the principle of one as precisely the same as the principle of the other, namely, the development of heat electrically in the neighborhood of the contiguous parts to be joined. I grouped the two processes in the same way that they are grouped by the Thomson Company, for instance, in the Lemp patent No.

*NOTE: It is interesting to note that while Harmatta in his original U. S. application, in his U. S. patent, in his Canadian application, and in his British patent, makes no mention at all of the kind of metal he proposes to weld; he does in his French patent, based upon the same identical apparatus, explicitly designate tinned iron (fer-blanc), three times—twice in the specification and once in the claims—as the metal to which his welding scheme is specifically adapted (Rec., pp. 1141, 1142, 1145, 1146, 1147).

It, therefore, does not lie in plaintiff's mouth to urge that the welding of tinned iron plates is not, exactly, the Harmatta invention!

> 553,923, which states that the invention relates to 'welding, soldering, cementing or similar operation.' The only difference is the necessary adjustment of current and time to secure the desired heating principle."

Mr. Dyer might have added that Prof. Thomson, in his so-called "Electric Soldering" patent, No. 496,019, groups electric soldering, brazing and welding together as belonging to the same class, thus (Rec., p. 1055):

> "My present invention, like my prior inventions in electric soldering, brazing and welding, involves the use of electric currents of low potential but large volume derived from any suitable source, together with suitable devices whereby the current may be cut off or regulated."

It has sometimes occurred to the writer of this brief that the title given the Thomson patent No. 496,019, *i. e.*, "Electric Soldering," represented an effort on the part of the specification writer (Mr. Townsend) to divert the mind of the Patent Office Examiner from the subject of electric welding to the subject of electric soldering with a view to giving the impression that Prof. Thomson's previous work in electric welding was quite different from his soldering scheme. The fact is, there is no true soldering described, with even fair particularity, anywhere in the patent, while the manipulation and electrical welding of tinned iron plates is specifically referred to throughout. If the writer of the Thomson specification had frankly described the invention as a process of electrical welding plates of tinned iron, as did Mr. Harmatta in his French patent No. 336,187, at a later date, when speak-

ing of the union of tinned iron (*fer blanc*) plates, he would have stated the truth and the Thomson patent would not have been open to this criticism.

THE ROBINSON PATENT 574,942 OF JAN. 12, 1897 (REC., p. 1070).

Other applications of electric resistance welding are disclosed in the Robinson patent No. 574,942, dated Jan. 12, 1897.

Robinson's purpose was to utilize the electric resistance-welding process in the production of railway joints.

One of the applications of this process shown by him was the welding of a fish plate or splice bar to the web of a railroad rail. In this embodiment of the process the fish plate or splice bar (C, Fig. 11) has formed upon its inner face at its upper and lower edges a series of isolated projections (i, i) which are adapted to bear against the plane vertical face of the web of the rail when the parts are pressed together by the electrodes that also supply the welding current.

The patent says (p. 2, line 92):

> "When the plate C is placed in the groove of the rail in position to be welded, these projections *i* find a bearing against the rail adjacent to the upper and lower corners of the groove of the same. The projections *i* are normally long enough to keep the main body of the plate C a short distance away from the rail. As soon, however, as the welding-current is turned on it quickly brings the projections *i* and the parts of the rail touched by them to a welding heat. The clamp is now applied to press the plate C and rail together to complete the weld as shown in Figs. 13 and 14."

The patentee points out that instead of employing the small projections on his fish plate or splice bar, he may use a series of ribs, as shown in the dotted lines, Fig. 16, but says (p. 3, line 20):

> "I prefer the arrangement of small independent projections to facilitate rapidity of welding, economy of current, and in order to have several small *welding spots* distributed over the rail rather than to have any single larger surface of the rail brought to a welding heat since the latter would be liable to deteriorate the rail."

The several other disclosures of this Robinson patent are discussed at length by Mr. Dyer (Rec., pp. 558-559), and the conclusion that he reaches is as follows (Rec., p. 559):

> "While, therefore, Robinson still makes use of the well known principles of resistance welding, he suggests the special refinement of welding the two pieces together in isolated spots (he calls them 'welding spots') which will be surrounded by very much larger areas of non-welding, and he localizes the welding current in these spots by providing projections or points which are traversed by the heating current and brought to the welding temperature, likewise heating the plates with which they contact to the welding temperature, so that when pressure is applied each projection so heated will constitute or form a single spot weld."

It is not amiss to add that not only did Robinson describe this application of the resistance welding to overlapped or superposed plates, but he made it the subject of several claims, a typical one of which is the following:

"8. In a rail joint a splice bar constructed for welded attachment to one only of the abutting rails, said bar being provided with a plurality of welding projections grouped nearer to one end of said bar than the other, said projections forming a plurality of welding connections with the same rail, the portion of said splice bar between said projections, and not raised to a welding heat, limiting the compression and regulating the predetermined relative position of said splice bar and rail when welded together, substantially as described."

THE KLEINSCHMIDT PATENT NO. 616,436 OF DEC. 20, 1898 (REC., p. 1076).

An application of resistance-welding very much like that of the patentee Robinson is found in the Kleinschmidt patent, No. 616,436 of Dec. 20, 1898.

Kleinschmidt, like Robinson, had in view the welding of splice bars to the webs of railroad rails. His patent shows in Fig. 2 a representation of his splice bar before welding. It is a bar that is generally plane-faced, but has a relatively low projection *b* near each end and a third low projection near the middle extending vertically across the face of the bar.

To secure the splice bars to the webs of the rails the bars were first clamped to the webs with their projections against the latter, by means of the circuit terminals or electrodes C, the welding current was then turned on and maintained until the parts were raised to the welding temperature, after which the current was turned off and the pressure retained until the parts cooled. As Kleinschmidt was dealing with parts of considerable mass, he laid much stress on the retention of the pressure on the parts after the cutting off of the current in order to make a more perfect union.

THE BURTON PATENT NO. 647,694 OF APR. 17, 1900 (REC., p. 1079).

Resistance-welding applied in many ways is disclosed by the Burton patent, No. 647,694 of April 17, 1900.

The patentee says (p. 1, line 9):

> "This invention relates to electric metal working apparatus for forging, welding and brazing of metals and for heating metal articles, such as wheel tires, for the purpose of setting them.
>
> "The invention is especially adapted for lap welding by the use of a primary transverse current. The lap weld is superior to the butt weld. *No end pressure* is required, and consequently, there is *no upsetting of* the metal and *no formation of a bulge or projection at the joint*, which is afterward required to be filed or hammered down."

The patent shows a rotary electrode head carrying on its various arms a variety of electrode tools adapted to co-operate with an electrode bed 100.

The mode of operation, where lap-welding is to be done, is described in the patent, as follows (p. 2, line 67):

> "In the use of this apparatus the pieces to be lap-welded are adjusted or placed with their ends overlapping on the bed electrode 100. Then the foot lever is depressed and one of the electrodes of the electrode head is brought into contact with the work, whereby the circuit is closed and the current passes through the work in transverse direction across the overlapping ends of the parts to be heated. The current may pass in either direction from the generator and effect the result

> equally well. As soon as the piece is heated to the proper temperature, which may be ascertained by inspection thereof, the operator releases the foot lever and the spring 170 lifts the hinged lever 150 and takes the upper electrode out of contact with the work, whereby the circuit is broken. Then the operator *may* shove the work forward on the anvil and hammer the joint or otherwise finish it, as desired."

Of course, if the parts worked are heavy, the joint may be improved by hammering on the anvil, but if they are relatively light this will not be required, nor done. The hammering step is plainly optional. It may or may not be resorted to.

Now, considering so much only of the prior art of electric resistance-welding as has been, so far, developed herein, it would seem perfectly obvious, even to a layman, that if the spherically ended electrode 240 of the electrode head of Burton should be brought around into operative relation with the flat copper bed electrode 100, and if the two pieces of metal to be lap-welded should be superposed or overlapped and placed between those electrodes and pressure and current applied and released, in accordance with the teachings of the patent and of the art, generally, the result would, inevitably, be a welding together of the two overlapped pieces, face to face, at a single isolated spot, and the weld so made would be surrounded by unwelded portions of the metal, in other words, a so-called, spot weld.

This is the view of defendant's expert, Mr. Dyer (Rec., pp. 560, 561, 577-579, 581, 587, 588, 605, 606, 607).

THE PERRY PATENT NO. 670,808 OF MAR. 26, 1901 (REC., p. 1083).

Another interesting example of resistance-welding is disclosed by the patent to Perry, No. 670,808, dated Mar. 26, 1901.

The welding together of crossed wires or of spherical bodies is described in this patent, whether these bodies be plain and uncoated, or coated with another metal.

When uncoated crossed wires are to be united they are crossed and pressed together in intimate contact by means of low resistance electrodes and the welding current is passed through until the contact surfaces of the wires are brought to the fusing or welding point, when the current is automatically cut off. The surfaces to be welded are, initially, but mere points of contact such as exist at the place where two crossed cylindrical bodies meet and touch each other, but the moment that pressure and current are applied, these points of contact, of course, flatten somewhat and the welded union really takes place between *small flattened surfaces* surrounded entirely by unwelded portions of the metal.

All the essentials of resistance-welding or, so-called, spot welding, with low resistance electrodes are, therefore, present. The bodies to be united are brought together face to face, instead of end to end; the low resistance electrodes are shaped to concentrate the current; the current is a welding current of high amperage and low voltage; pressure and current are simultaneously applied; and the current is automatically cut off.

The patentee says (p. 1, line 34):

"By my invention the welds are made instantaneously without any appreciable heating of the material adjacent to the point of the weld, and my improved method consists in the simultaneous application to the parts to be joined or welded of a mechanical pressure nearly equal to the crushing strength of the material and a current of electricity of relatively enormous volume. By using a mechanical pressure nearly equal to the crushing strength of the material, I insure the parts being forced together the instant they soften, and by the employment of a current of electricity of relatively enormous volume compared with the area of contact of the parts to be welded, I am enabled to produce an instantaneous heating or softening of the metal. The welding current is much stronger than has heretofore been considered suitable, being from one to two hundred thousand amperes to a square inch, while the mechanical pressure of the electrodes for forcing the heated parts together, is nearly equal to the crushing strength of the material being welded when cool. As a result of this the parts to be welded are first brought into intimate contact and immediately thereafter the circuit is closed between the electrodes. The current is of such strength that the contacting parts of the said members become heated to a fusing point immediately and as soon as the metal sufficiently softens, so that its resistance is less than the force of the compression spring or weight, such spring or weight forces the movable electrode farther toward the stationary electrode to weld the parts together. Immediately after this compression the circuit is broken and before the heat is spread away from the contacting surfaces. Consequently, the metal cannot be overheated or blown out. As the electrodes are relatively of large volume or area compared to the contacting metal to be welded, there is no necessity for artificial cooling."

THE PARKINSON BRITISH PATENT NO. 14,536 OF 1894 (REC., p. 1112).

Among the various industrial applications of resistance-welding disclosed in the prior art patents is the securing in place of the "glut pieces," so-called, to the arms or spokes of a metallic wheel. Each glut piece is a triangularly-shaped piece of metal whose inclined sides are adapted to fit between and against the correspondingly-shaped surfaces of two adjoining metallic segments or spoke-portions of the wheel.

The parts are clamped together by low resistance electrodes consisting, on the one hand, of a single electrode bearing against the base of the glut piece and, on the other hand, of two separate electrodes, one of which bears against the one segment-arm and the other against the adjoining segment-arm.

On pressure being applied and a proper welding current turned on, the resistance of the glut pieces (which is lower than that of the electrode) and the resistance offered to the passage of the current at the joint between the glut piece and the segment-arms, causes the proximate faces of the parts at the joint to be raised to a fusing or welding temperature. Continued pressure firmly unites or welds the parts together.

In the discussion of this Parkinson patent by Mr. Dyer, defendant's expert (Rec. pp. 565, 566, he says (p. 566):

> "In operation, when the contact piece M is forced by hydraulic pressure against the glut piece, the two contact arms or electrodes L will be pressed on the inside of the wheel opposite the glut piece, so that when heating current is applied it will flow from each electrode L through

the metal of the wheel, past the joint between the same and the glut piece and through the glut piece to the contact piece M. Each electrode L, therefore, feeds the current into the work in a limited area, and the current is, therefore, concentrated or localized by the electrode, so as to heat the metal at the joints and within a localized area to the welding temperature, whereby, under the hydraulic pressure, a limited isolated weld will be formed between each wheel segment and one of the glut pieces, which welds will be surrounded by extended areas of non-welding. This patent, therefore, discloses a further field of usefulness to which resistance-welding may be applied, namely, for the manufacture of railway or other wheels, it utilizes the same resistance principle originally disclosed by Prof. Thomson, in which the resistance of the work is depended upon to secure the heating effect, the current is localized and pressure is localized by means of an electrode of limited area, whereby the heating current is confined to a restricted path which cuts the joint and in this way the heating effect is localized or restricted, whereby the metal at the joint within a limited area will be brought to the welding temperature so that when pressure is applied between the parts an isolated weld will be secured, surrounded by areas of non-welding."

THE DE FERRANTI BRITISH PATENT NO. 11,921 OF 1903, FILED MAY 25, 1903 (REC., p. 1119).

A short description of the disclosure of this patent given by Mr. Dyer, defendant's expert (Rec. p. 567) will suffice, for present purposes (p. 567):

"I next refer to British patent to de Ferranti No. 11,921 of 1903, application for which was filed May 25, 1903, describing still another field of usefulness to which resistance-welding may be ap-

plied, namely the welding of turbine blades to the disks, drums or the like which carry them. Referring to Fig. 2, for instance, the disk or drum is shown as being provided with two sets of intersecting grooves *e* which result in the formation of a series of points or projections rectangular in cross section. The turbine blades *d* are now placed in position radially, and when heating current is passed through the blades the current will be concentrated by so much and so many of the projections as may make contact with the engaging surface of the blade, and by means of these projections the current will be concentrated so that the projections themselves, as well as those parts of the blade surface as may contact with the projections will be brought to the welding temperature, whereby, when pressure is applied a series of separate isolated welds will be formed surrounded by areas of non-welding. In Figs. 3 and 3a the same general principle is applied, except that the current is concentrated at the weld by forming the disk with two circumferential and parallel ribs, whereby two isolated welds will be formed to hold each blade in place. In Fig. 9a three of such ribs are shown, resulting in the formation of three isolated welds, and in Fig. 6 the face of the disk is bored with closely arranged holes *h* whereby the current will be localized by the metal between the holes and the resulting welds will be surrounded by areas of non-welding."*

THE GERMAN PATENT OF BENARDOS NO. 50,909 OF MAY 8, 1889, ISSUED FEB. 19, 1890 (REC., p. 1148).

The process of electric resistance-welding is also shown applied, in various ways, in the German patent of Benardos, No. 50,909 of May 8, 1889.

*NOTE: The claims of de Ferranti as a prior inventor over Harmatta, under Sec. 4887 R. S. U. S., and the International Convention, are discussed in the brief (p. 152).

Defendant has introduced a translation of this patent (Rec. p. 1152), made by Mr. Howard A. Coombs, of Washington, D. C. (Rec., p. 702), and plaintiff has offered another translation made by Mr. Walter Brant, of West Roxbury, Mass. They do not differ in any material respect.

Beyond any question, Benardos contemplated the welding of relatively thin plates of metal by the aid of electrodes which applied pressure and fed the welding current to the work at the point where the weld was to be formed. His dominant thought undoubtedly was to use electrodes of relatively poor conductivity and high resistance so as to develop heat in the electrodes themselves at the backs of the plates as in Thomson patent No. 496,019 hereinbefore considered. He contemplated both electric soldering and electric welding, for his patent states (Rec., p. 1152):

> "This process may serve to directly *weld* together relatively thin metal sheets and rods, of one and the same or of different metals; to the joining of metals with the use of a solder; to heating metal objects or parts to a definite temperature for the purpose of hardening them, and to annealing hardened objects by heating them to a certain temperature."

In the form of apparatus shown in Fig. 1 of his patent the current employed passes through his pressure electrode and thence through one only of his overlapped plates, the heat generated in the electrode itself being relied upon to raise the overlapped parts to the proper welding temperature.

In the form of apparatus shown in Fig. 6, the current does not pass directly through the work at all,

but merely through electrodes, each of which forms part of a separate circuit. The patent says (Rec., p. 1154):

> "Fig. 6 illustrates an apparatus which is distinguished from those hereinbefore described in that the current does not pass through the work itself."

The form of apparatus which is, however, of particular interest in this case is that shown in Fig. 2, which is described as follows (Rec., p. 1153):

> "Fig. 2 shows, in plan, elevation and end view, an apparatus designed to carry out the process in the manner just described. Two welding tools K′ K″, are united in the manner of a pair of shears or tongs, both being oscillatably mounted on the pivot C. The current is prevented from passing from one tool to the other through the said pivot by the interruption of insulating material. Binding screws D′ D″, receive the ends of the flexible cables connected to the poles of the source of electricity. The current thus flows from D′ through K′ to *w*′, from this block of refractory and poorly conducting material through the metal of the work to block *w*″, and returns through K″ and D″ and through a rheostat to the source of electricity. H′ and H″ are the wooden handles, and E is a spring by which the two blocks w′ and w″ are pressed together (apart)."

The patent mentions as examples of relatively bad conducting materials that may be employed as electrodes, graphite, prepared carbon, mixture of clay with carbon, magnesium, iridium, carbon with thin metal coatings (Rec., p. 1152).

Taking copper as a standard, all these enumerated materials are undoubtedly relatively poor conductors, yet some of them are better conductors than iron, of which the plates to be united are supposed to be composed, as the following table shows (Rec., p. 589):

Conductivity of	Copper.....	100.
"	Magnesium ...	36.2
"	Iridium	26.
"	Tungsten	28.8
"	Iron	17.9
"	Graphite	.195
"	Carbon	.22

The merest tyro in this electric resistance-welding art must appreciate that when electrodes made of any of the materials mentioned by Benardos as suitable, are employed to clamp the superposed metal plates and to feed the current through the work from one electrode to the other, as contemplated in the use of the apparatus of Fig. 2 of the patent, the current *must*, if it passes at all, encounter the resistance of the electrodes, the resistance of the joints between the electrodes and the backs of the plates, the resistance of the plates themselves, and the resistance of the joint between the inner contacting faces of the plates, and that wherever this resistance is encountered heat will be developed.

If carbon or graphite electrodes, or any other electrodes of low conductivity and high resistivity are used, to weld plates of higher conductivity and lower resistivity more heat may be developed in them than in the plates themselves, or at the contact surfaces between the plates, and a portion of the heat utilized at the place where welding actually occurs, namely, at the point of surface contact between the plates, may

be conveyed there by *conduction;* or, at least the heat generated at such point of surface contact between the plates will not be conducted away by such electrodes* whereas, if the electrodes used are made of magnesium or of iridium, or of carbon coated with metal, or of any other materials, whose resistivity is lower than that of the plates, the greatest resistivity and the consequent greatest heat development will take place in the plates and at the contact surfaces between the plates.

In any case, the contact of the electrodes with the plates will be restricted to a spot, the heating electric current will be passed from one electrode to the cooperating electrode through that spot to heat the work to the welding temperature and the pressure will be applied to the work in line with said spot to effect a

*NOTE: There will be found in the record (Rec., p. 2094) a copy of patent No. 1,176,614, granted March 21, 1916, to A. M. Stanley, assignor to the General Electric Company (by which Professor Thomson is now employed as consulting engineer) which describes the use of tungsten, molybdenum, or other metals of low conductivity and and high resistance as especially adapted to the spot welding of metal plates and particularly of plates of copper. The patent states (p. 1, line 85):

> "I have found that in order to successsfully weld sheet copper (which may here serve as the representative of low resistance and good heat conducting metals) it is necessary that the pressure contacts be of a material that has a considerably higher specific resistance than copper and that its ohmic resistance be sufficiently high that it may be heated by the current as much or more than the copper and then act as a barrier to heat conduction from the work; that it be a comparatively low conductor of heat for the same purpose; that it be *more refractory* than copper, so that it will not soften and become welded to the copper; and that it have considerable mechanical strength and not be noticeably deteriorated by exposure to air at the temperatures to which it is subjected. I have found all these characteristics combined in the metals tungsten and molybdenum, and by the use of either of them as pressure contacts, I have been able to weld together sheets of copper and other metals of like properties safely and expeditiously, and without deterioration of the contacts after long continued use."

welding of one plate to another, and the Harmatta process of so-called spot welding will be practiced.

Moreover, the work so produced will be metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union, and will be the product of the Harmatta patent.

A detailed explanation of this Benardos German patent will be found in Mr. Dyer's deposition (Rec., pp. 563, 589, 608 *et seq.*, p. 611, *et seq.*).

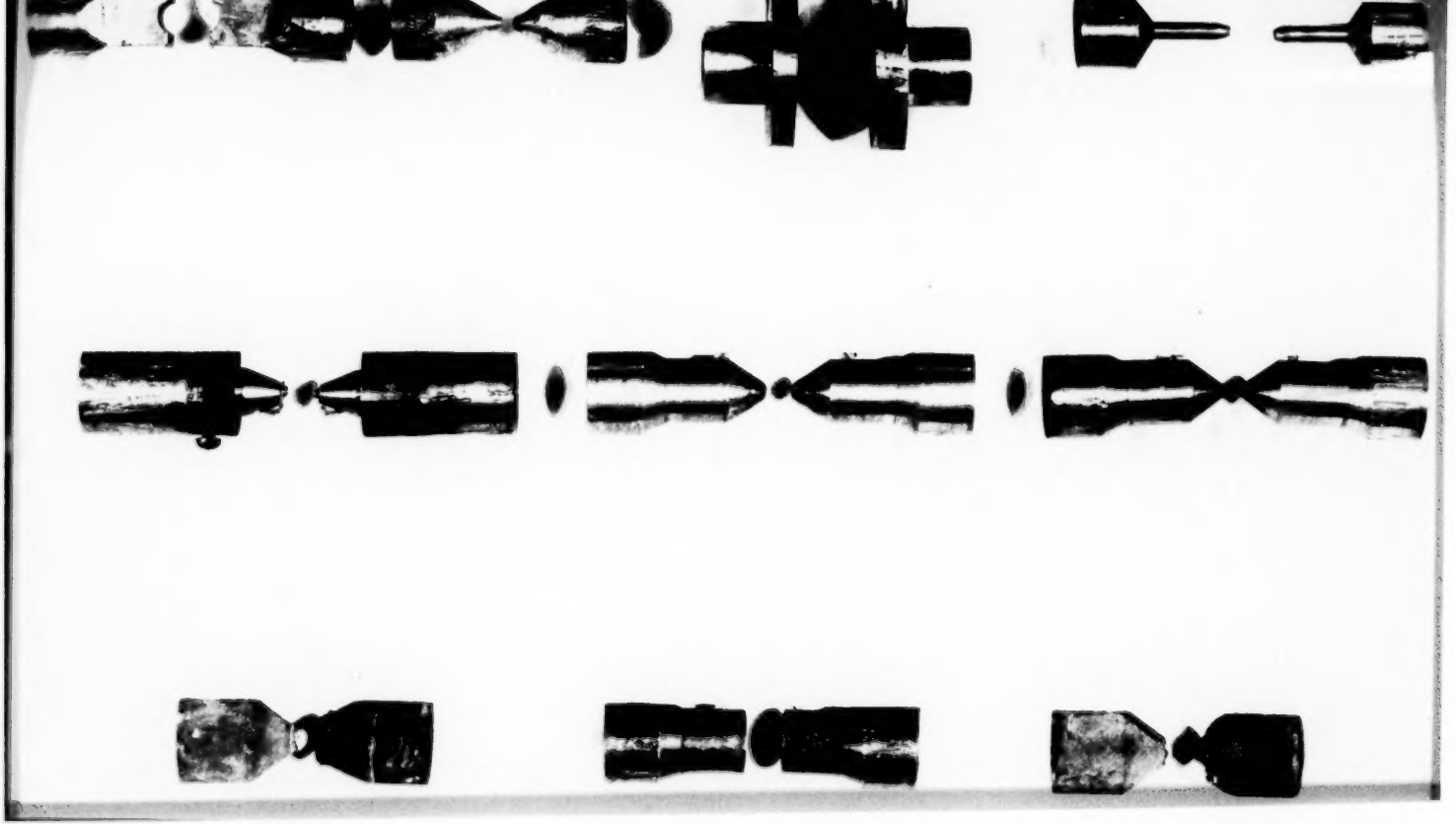
Mr. Dyer testified to having made many tests demonstrating the practicability of producing, so-called spot-welds by means of carbon electrodes, graphite electrodes, electro-plated carbon electrodes (pp. 601, 612), iridium electrodes (pp. 601, 613) and offered in evidence photographs showing many of the forms of electrodes used by him (p. 612). (See photograph opposite, and explanation of same, Rec., p. 612.)

He also offered to repeat his tests for the benefit of plaintiff's counsel (p. 613).

This patent constitutes the finest kind of corroboration of the testimony of defendant's expert, Mr. Dyer, to the effect that electrodes composed of refractory material of low conductivity and of relatively high resistance, like some of those proposed by the Benardos German patent, are entirely available for the practice of spot welding. According to the official tables quoted by Mr. Dyer, the resistance of iridium mentioned by Bernados as available is 6.1 and its conductivity is 26, while the resistance of tungsten, the metal recommended by the Stanley patent, as highly available, is 5.57, and its conductivity is 28.8.

It is interesting to note that the Stanley patent discloses the use of tungsten for spot welding, both in the form of roller electrodes and in the form of pin electrodes, indicating that both forms are regarded as equivalents, by Stanley, just as they were apparently regarded as equivalents by Harmatta, in his original U. S. application.

As in view of the disclosure of the Stanley patent the Benardos apparatus would plainly spot-weld copper sheets, it is clear that Benardos is a clean-cut anticipation of Harmatta, who undertakes, in his U. S. patent, to cover the spot welding of *all* metals by any *sort* of electrodes, whether of high or of low resistance.



Mr. Gravell, plaintiff's expert, admits that carbon electrodes, coated with metal, will produce spot welds (Rec., p. 84).

The Application of Electric Resistance-Welding Here in Controversy Was Never Patentable to Harmatta.

The alleged process or improvement in the art that is here being exploited as the invention of Johann Harmatta never was an invention patentable to him, but is a mere obvious application of the principles of electric resistance-welding well known before his time.

Let it be distinctly understood that there is no patent for a machine or apparatus before the Court. The patent is, first, for a process, and, secondly, for an article made by that process.

The essential steps of the process are (1) overlapping or superposing two metal parts, face to face, (2) applying pressure and current to a portion only of such overlapping parts, (3) maintaining such pressure and current till the contact surfaces of the portions of the parts to which such pressure and current are applied are welded together at such contact surfaces only.

As a process, it differs from the process of the original Thomson art patent of 1886 only in the fact that the welding is localized in a relatively small contact spot instead of extending over the entire proximate surfaces of the parts to be united.

It is exemplified in the Thomson, so-called, riveting patent No. 396,015, wherein the plates are welded together in spots remote from the rivet; in the Thomson, so-called, roller-electrode patent No. 444,928, in

the Lemp patent, No. 553,928, and in Figs. 2 and 3 of the original Harmatta application wherein the overlapped sheets of metal are united, first, at a spot or part only and then at a succession of spots or parts; in the Thomson, so-called, soldering patent, No. 496,019, in which tin-coated iron plates are united in spots of limited area either by the localization of current between the plates or at the backs of the plates or at both places; in the Robinson, so-called, rail-joint patent, No. 574,942, wherein a plate formed with small isolated projections is welded to an opposing flat plate; in the Kleinschmidt, so-called, rail-joint patent, No. 616,436, wherein, also, a plate with isolated projections is welded to an opposing flat plate; in the Burton patent, No. 647,694, wherein overlapped plates are welded together in spots only by means of a spherically-shaped electrode, on the one side, and a flat co-operating electrode, on the other; in the Perry patent, No. 670,808, wherein crossed wires are welded together in isolated spots by the operation of opposed electrodes; in the de Ferranti British patent, No. 11,921, of 1903, wherein a turbine blade is welded in spots only to the blade carrier; in the Parkinson British patent, No. 14,536, of 1894, wherein the glut pieces are welded in spots to wheel segments by the application of opposed electrodes which apply the suitable pressure and current; in the Benardos German patent, No. 50,909, of 1889, and in the Harmatta patent in suit wherein overlapped sheets of thin metal having uninterrupted plane surfaces are welded in isolated spots by means of opposed pointed electrodes which apply the requisite pressure and current at the spots only; and in the Rietzel patent, No. 928,701, of 1909, wherein one or both of the sheets is or are pro-

vided with separate welding projections through which the pressure and current are applied.

Once we rid ourselves of the notion that this process or method is confined to the use of any specific form of apparatus or instrumentality, we will have no difficulty in apprehending just what the process in essence is.

On the folder opposite we have illustrated the various applications of resistance welding shown in the patents above referred to, whereby welding in isolated spots is accomplished.

Process Distinguished From Apparatus

This Court has always distinguished a process from the mere function of a machine or apparatus.

In the recent case of Expanded Metal Company vs. Bradford, 214 U. S., 366, the Court in reply to the contention that a process, to be patentable, must be the result of chemical or other similar elemental action, reviewed its former decisions and held that a process or method involving mechanical operations might be patentable, independently of the particular mechanisms for performing it.

Mr. Justice Day in delivering the opinion of the Court, said (p. 382):

> "An examination of the extent of the right to process patents requires consideration of the object and purpose of the Congress in exercising the constitutional power to protect for a limited period meritorious inventions or discoveries. Section 4886 of the Revised Statutes provides:
>
> " 'Any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement thereof * * * may obtain a patent therefor.'

This is the statute which secures to inventors the right of protection, and it is not the province of the courts to so limit the statute as to deprive meritorious inventors of its benefits. The word 'process' is not used in the statutes. The inventor of a new and useful art is distinctly entitled to the benefit of the statute as well as he who invents a machine, manufacture, or composition of matter. The word 'process' has been brought into the decisions because it is supposedly an equivalent form of expression or included in the statutory designation of a new and useful art.

"What then is the statutory right to a patent for a 'process' when the term is properly considered? Curtis, in his work on the Law of Patents, says:

" 'A process may be altogether new, whether the machinery by which it is carried on be new or old. A new process may be invented or discovered, which may require the use of a newly invented machine. In such case, if both the process and the machine were invented by the same person, he could take separate patents for them. A new process may be carried on by the use of an old machine in a mode in which it was never used before * * *. In such a case, the patentability of the process in no degree depends upon the characteristic principle of the machine, although machinery is essential to the process, and although a particular machine may be required.' Curtis, 4th Ed., Sec. 14.

"In Robinson on Patents, Vol. 1, Sec. 167, it is said:

" 'While an art cannot be practiced except by means of physical agents, through which the force is brought in contact with or directed towards its object, the existence of the art is not dependent on any of the special means employed. It is a legal, practical invention in itself. Its essence remains unchanged, whatever variation takes place

in its instruments as long as the acts of which it is composed are properly performed.'

"And Walker on Patents, 4th Ed., Sec. 3, states that valid process patents may be granted for 'operations which consist entirely of mechanical transactions, but which may be performed by hand or by any of several different mechanisms or machines.'

"It is undoubtedly true, and all the cases agree, that the mere function or effect of the operation of a machine cannot be the subject-matter of a lawful patent, but it does not follow that a method of doing a thing so clearly indicated that those skilled in the art can avail themselves of mechanism to carry it into operation, is not the subject-matter of a valid patent. The contrary has been declared in decisions of this Court. A leading case is *Cochrane vs. Deener*, 94 U. S., 780, in which this Court sustained a process patent involving mechanical operations, and in which the subject was discussed by Mr. Justice Bradley, speaking for the Court. On page 787, that learned justice said:

" 'That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed * * *. Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process being the same. A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable, whilst the process itself may be altogether new and produce an entirely new result. The process requires that certain things

should be done with certain substances, and in a certain order, but the tools to be used in doing this may be of secondary consequence.'

"This clear and succinct statement of the rule was recognized and applied (Mr. Justice Bradley again speaking for the Court) in the case of *Tilghman vs. Proctor*, 102 U. S. 707. In the course of the opinion the learned justice tersely says:

" 'A machine is a thing. A process is an act or a mode of acting. The one is visible to the eye—an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed. Either may be the means of producing a useful result.'

"That this court did not intend to limit process patents to those showing chemical action or similar elemental changes is shown by subsequent cases in this court.

"In *Westinghouse vs. Boyden Company*, 170 U. S. 537, the opinion was written by the same eminent justice who wrote the opinion in *Risdon Locomotive Works vs. Medart*, 158 U. S., *supra*, and delivering the opinion of the Court, he said (p. 557):

" 'These cases (158 U. S. 68, and 103 U. S. 461) assume although they do not expressly decide, that a process to be patentable must involve a chemical or other similar elemental action, and it may be still regarded as an open question whether the patentability of processes extends beyond this class of inventions.' And added these significant words:

" 'Where the process is simply the function or operative effect of a machine, the above cases are conclusive against its patentability; but where it is one which, though ordinarily and most successfully performed by machinery, may also be performed by simple manipulation, such, for instance, as the folding of paper in a peculiar way for the manufacture of paper bags, or a new method of weaving a hammock, there are cases

to the effect that such a process is patentable, though none of the powers of nature be invoked to aid in producing the result. *Eastern Paper Bag Co. vs. Standard Paper Bag Co.*, 30 Fed. Rep. 63; *Union Paper Bag Machine Co. vs. Waterbury*, 39 Fed. Rep. 389; *Travers vs. Am. Cordage Co.*, 64 Fed. Rep. 771. This case, however, does not call for an expression of our opinion upon this point, nor even upon the question whether the function of admitting air directly from the train pipe to the brake cylinder be patentable or not, since there is no claim made for an independent process in this patent, and the whole theory of the specification and claims is based upon the novelty of the mechanism.'

"And the same learned justice wrote the opinion of the court in *Carnegie Steel Co. vs. Cambria Iron Co.*, 185 U. S. 403, and sustained a process patent. If by any construction that process could be said to involve a 'chemical or other similar elemental action,' no stress was laid upon that fact. This court, speaking through Mr. Chief Justice Waite, sustained a patent in the *Bell Telephone Cases*, 126 U. S. 1, for a method of transmitting electrical undulations similar in form to the vibrations of the air accompanying vocal sounds, and at the same time the patent for the apparatus by which the method was operated was sustained.

In *Leeds & Catlin vs. Victor Talking Machine Company*, decided at this term, 213 U. S., 301, 318, this court said: 'A process and an apparatus by which it is performed are distinct things. They may be found in one patent; they may be made the subject of different patents.'

"We therefore reach the conclusion that an invention or discovery of a process or method involving mechanical operations, and producing a new and useful result, may be within the protection of the Federal statute, and entitle the inventor to a patent for his discovery.

> "We are of opinion that Golding's method was a substantial improvement of this character, independently of particular mechanisms for performing it, and the patent in suit is valid as exhibiting a process of a new and useful kind."

Applying the principles laid down in the above quoted decisions, we find that Harmatta did not invent the process or method of welding in spots, for that was old and well known before he entered the field and had been carried into practice by various forms of instrumentalities or apparatus.

He was not the first to conceive the idea of electrically welding overlapped or superposed metal plates or pieces at a relatively small contact spot instead of over the whole of their juxtaposed surfaces. Thomson, Robinson, Kleinschmidt, Benardos, Burton and others had done this before him, by the use of various forms of apparatus.

Even the forms of apparatus suggested by Harmatta for carrying into practice this process of welding in spots were not new. That form of apparatus which he elaborated with the greatest thoroughness and claimed most specifically in his application for patent as originally filed (and which, by the way, does not appear at all in the patent as issued) to wit, the form which involves the use of roller electrodes, was found by his solicitors to be anticipated, in substance, by the early Thomson and Lemp patents and, for that reason was jettisoned by them at an early day. His other form of apparatus, to wit, that involving the use of pin electrodes, is shown in the Benardos German patent of 1890, and in the Burton patent of 1900, which the Patent Office Examiner seems to have entirely overlooked.

All of the Process or Method Claims of the Harmatta Patent Are Anticipated and Void.

The method or process claims of the Harmatta patent read as follows (Rec. p. 389):

> "1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.
>
> "2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.
>
> "3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces, so as to limit the union of the pieces to a spot or spots.
>
> "4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union so as to produce an isolated spot or spots of union, leaving distinct or well defined areas in which the pieces are not welded together.

"5. The method of uniting two sheet metal pieces together, face to face, consisting in pressing them together, and simultaneously with the pressure, passing an electric current from one to the other at isolated or distinct spots in the areas lapping or opposed, said spots being separated from one another by such a distance that there is a union of the sheets at spots entirely surrounded by the areas of no union.

"6. The method of uniting sheets of metals by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well defined and comparatively extensive area of no union completely surrounding said spot.

"7. The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes, pressing said electrodes firmly together and closing the circuit, whereby a small, sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth.

"8. The method of electrically welding two plates or sheets of metal together face to face between electrodes, consisting in restricting the area of contact of an electrode with said plates to a spot, passing a heating electric current from said electrode to the co-operating electrode through said spot to heat the work to welding temperature and applying pressure to the work in line with said spot to effect a welding of one plate to the other.

"9. The herein described method of producing a welding temperature in a small distinct spot or point of the opposed surfaces of two plates of metal, consisting in applying pressure at a point or spot only at the back of a plate coinciding with the desired point or spot of welding, while the plates are assembled face to face, to localize the

flow of current in the required point or spot in the meeting surfaces and passing an electric current through the plates in the line of the applied pressure to bring the material to welding temperature at the spot of welding by the resistance of the work to the passage of such current.

"10. The method of electrically welding a piece of sheet metal at a small distinct spot or point in its plane surface to the face of another piece of metal, consisting in applying pressure at a small point or spot on the back of the sheet to localize the pressure and electrical heating of the work at a spot of electrical contact in the opposed surfaces of said pieces beneath the point of applied pressure, and passing an electric current from one to the other at the said spot of localized electrical contact to produce a welding temperature at said spot and maintaining the localized pressure to effect a welding at said spot.

"11. The herein described method of welding two pieces of sheet metal together by a weld at a small spot only of their opposed surfaces, consisting in applying pressure localized in a spot on the back of a sheet directly over the desired spot of union, while said sheet is assembled face to face with the opposite sheet and so as to localize the pressure and electrical heating in a spot in the meeting surfaces of the sheets, and effecting the weld by passing an electrical current from one sheet to the other through said spot in the line of the localized applied pressure, and by pressure applied in said line.

"12. The method of electrically welding two pieces of sheet metal to one another, consisting in pressing the sheets together by pressure applied and localized in a distinct well-defined point or spot on the rear surface of a sheet while passing an electric current through them in the line of the pressure, thereby localizing the path of the heating current from one to the other of the meeting surfaces of the sheets to cause the said sheets

to be heated to welding temperature by the electric resistance of the work at said spot, and applying pressure localized over said spot whereby the pieces are welded together at a distinct well-defined spot in their meeting surfaces answering the purposes of a rivet.

"13. The method of electrically welding two plates of metal together face to face, consisting in pressing the plates together between two electrodes one of which at least makes contact with the rear of a plate at a spot only, feeding a heating electric current into the plates by said electrodes to bring the plates to welding temperature by the heating effect due to the electrical resistance of the portion of the circuit containing said plates, and effecting an electric welding of one plate to the other at a spot beneath the electrode by the pressure of said electrode.

"14. The herein described method of fastening two sheets of metal together at a distinct point or spot only in their plane meeting surfaces, consisting in pressing the sheets together and localizing the contact pressure of each upon the other at the said distinct spot or point, passing an electric current from one sheet to the other through said localized spot of contact pressure between them to bring the metal to welding temperature in said spot and thereupon completing the weld in the material so brought to welding temperature and uniting the pieces by a welded union at said spot only.

"15. The herein described method of fastening two pieces or sheets of metal together at a spot only in their meeting surfaces, consisting in pressing them together at said spot, passing an electric current through said pieces or sheets at said spot to raise the same to welding temperature and applying welding pressure localized in the back of a sheet immediately over said spot to effect the weld.

"16. The herein described method of welding two pieces of sheet metal together by pressing them together between electrodes engaging the surface of the sheets at a spot only and bringing the section of work between them to the welding temperature by its resistance to the passage of an electric current fed through the work by said electrodes."

Of these sixteen claims, the first six were taken bodily from the Rietzel patent. They were originally prepared by the astute counsel of the Thomson Company, after knowledge of the disclosures of the Harmatta foreign patents, to cover the spot welding of plane-faced plates or parts, as well as the union of plates or parts having pre-formed projections like Rietzel's, and they well accomplished that result.

Take claim 3, for instance, which reads:

"3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots."

But, unfortunately for the plaintiff, this claim not only applies to the disclosures of Rietzel and of Harmatta, but also to the disclosures of Thomson, Robinson, Kleinschmidt, Benardos and other prior workers in the art.

The same is true of the other method or process claims, as well those taken from the Rietzel patent, as those that were superadded after the termination of the interference with Rietzel to better cover Rietzel.

None of such superadded claims, however, expresses a patentable distinction over the claims taken from Rietzel, as examination will show. All of them are broad and all-covering and were intended so to be. Each reads upon the disclosures of Rietzel, and, by the same token, reads also upon the disclosures of Thomson, Robinson, Benardos, Burton, and others of the prior art and is anticipated and invalidated by the latter.

In this connection, the Court is respectfully referred to the very lucid discussion of the prior art by Mr. Dyer, defendant's expert. (Rec., pp. 546-614.)

PLAINTIFF'S ABORTIVE EFFORTS TO DRAW DISTINCTIONS BETWEEN HARMATTA'S PROCESS OR METHOD AND THE PROCESSES OR METHODS OF THE PRIOR ART.

Throughout their testimony the expert witnesses for the plaintiff have endeavored to draw distinctions between the process or method disclosed by Harmatta and that disclosed in the prior art, and to make out that Harmatta's process or method presents something radically new. But all such efforts are futile and will not bear analysis. They relate, in the main, to alleged differences in the apparatus or instrumentalities employed and the materials operated upon, and have no bearing at all on the questions of the novelty of the process or method, as such.

Some of these attempted differentiations will now be briefly discussed.

Roller Electrodes and Pin Electrodes

(1) On this point, it is first to be observed that Harmatta himself in his United States application,

as originally filed, as well as in his Canadian application, and in his British (Rec., p. 1124) and French (Rec., p. 1144) patents, draws no distinction at all between the process or method practiced by the use of pin electrodes and that practiced by the use of roller electrodes. He tells us that his electrodes, whether of one form or the other, may be made to approach and recede from each other, at will, so as to apply pressure and current to the interposed metal plates or parts to form the welds. With his roller electrode apparatus it goes without saying that he may either weld a continuous uninterrupted seam or, by opening and closing the rollers and shifting them, or the work (both methods are indicated as practicable in his original disclosure), he may make welds at distinct isolated spots as far apart as desired, having areas of no weld between them.

Defendant's expert, Mr. Dyer, says this may be done, and plaintiff's expert, Mr. Gravell, admits it. (Rec., p. 104.)

Harmatta, in his original United States specification, fully appreciated that the use of roller electrodes involved no essentially different operation, nor the consumption of any more current, than the repeated use of straight pin electrodes, for he says (Rec., p. 1358.):

> "Fig. 2 is a front elevation and Fig. 3 a side elevation of a device which may be employed for continuous welding, the pressure being exerted by roller electrodes, whereby the *advancing series of single points* of the seam to be welded is united to a whole with a minimum consumption of current."

(2) The prior Thomson patent No. 444,928 (Rec., p. 1047), and the prior Lemp patent, No. 553,923 (Rec., p.

1065), both show roller-electrode welding apparatus in which the electrodes are, and are intended to be, adjustable toward and from each other, the same as in the Harmatta roller-electrode apparatus, and the same capacity to weld continuously by an "advancing series of single points" or at separated points or spots, is found in all of them. The Thomson patent, as we have seen, tells us that, first, one spot is welded and then, thereafter, a continuous welding takes place (Rec., p. 1048, bottom of column 2), the language used being "so as to bring successive parts of the joint into position to be pressed and heated at the same time."

As instrumentalities for practicing the process or method of, so-called, spot welding, the roller electrodes are, therefore, as competent as straight pin-electrodes.

Whether or not it be claimed for Harmatta that the devising of his pin-electrode apparatus involved a mechanical improvement or improvement in *apparatus*, it certainly cannot be justly contended that the use of such pin-electrode apparatus involved the practice of a different art, process or method from that involved in the use of a roller-electrode welding apparatus whose rollers were openable and closable, at pleasure, on the work.

Plaintiff's counsel, in the early stages of the case, tried to establish that the use of roller electrodes in a welding apparatus was entirely impracticable, but the testimony on both sides turned out so overwhelmingly against them, on this point, that they probably will not renew the contention again. (Dyer, Rec., p. 583; Gravell, Rec., pp. 103, 104, et seq.; Knapp, Rec., p. 221; Knapp, Jr., Rec., p. 233, et seq.; Clark, Rec., p. 263; Thomson, Rec., p. 533.)

But to Harmatta does not belong the distinction of even having first devised a pin-electrode apparatus. The German patent to Benardos (Rec., p. 1152), and the United States patent to Burton (Rec., p. 1081), show such form of apparatus employed to electrically weld, at spots, overlapped or superposed plates or pieces of metal by a process or method identical with that claimed by Harmatta.

As to the form of pin-electrodes, much has been said in the testimony offered in behalf of the plaintiff in regard to the merits of pin-electrodes with pointed ends. In Figs. 1 and 2 of the Harmatta patent the electrodes happen to be shown pointed but in the actual practice of spot welding two (2) pointed electrodes are seldom used except to weld tin and like metals of low fusibility. Figs. 3 and 4 show electrodes of other forms. The machines brought from Germany in 1904 and installed at the factory of the National Enamelling and Stamping Co., and claimed by plaintiff to be Harmatta machines, though not proven to be such, had electrodes of uniform diameter throughout, with blunt ends (Knapp, Rec., p. 129; Herring, Rec., p. 132).

If there is anything in tapering or rounding the ends of electrodes the Burton patent and the German patent of Benardos show it (Rec., p. 1151), and these antedate Harmatta.

Thickness of Plates or Parts Operated Upon

Now and again in the testimony offered by the plaintiff will be found glowing tributes to the capacity of Harmatta's pin-electrode apparatus to unite by welding in spots, very thin sheets of metal. But these are tributes to *apparatus* and not to process or

method. The same process or method is involved in the use of any roller electrode apparatus, whether of Harmatta's invention, or of the invention of Thomson or of Lemp or of anybody else upon plates of *any* thickness. The thickness of the plates operated upon has, therefore, nothing to do with the novelty of the broad process or method under discussion.

That process or method, as shown by the evidence on both sides, is applicable to the union of metal plates or pieces regardless of their thickness.

Mr. Dyer testified he had successfully spot-welded a cold-rolled steel plate 1/32 of an inch thick to a 1/2 inch bar (Rec., p. 603). Mr. Gravell, plaintiff's expert, admitted that the Harmatta patent is not limited to the welding of plates or pieces of any specific thickness (Rec., p. 77); that he has seen plates 3/8 of an inch thick spot-welded together (Rec., p. 79, X-Q. 78) and that theoretically there is no limit to the thickness of material that may be spot-welded (Ibid, X-Q. 80). Prof. Thomson testified to the spot welding of plates of from 3/8 to 1/2 inch in thickness (Rec., p. 541). The catalogue issued by the Universal Welding Co., licensee of plaintiff's predecessor marked Defts. Ex. 10 says: "We can spot weld any gauge of material from the lightest gauge up to one inch thick." There was not in the United States application of Harmatta, as originally filed, any limitation placed on the thickness of the plates that could be successfully welded by the Harmatta apparatus, of either form. Nor does any such limitation appear in the Harmatta patent as granted.

During the prosecution of his United States application, when it was doubtful whether, even in view of the very limited prior art that had been cited by the Examiner, any novelty whatever could be found in

Harmatta's disclosure, an amendment was filed limiting the scope of the Harmatta invention to an apparatus for the union of sheets of "from about two millimeters in thickness downwards" (Rec., p. 1375) though there was no such limitation suggested in the original Harmatta application. Two millimeters is about 2/25 of an inch.

In the interference that was subsequently declared between Rietzel and Harmatta, it was stoutly contended by the plaintiff's predecessor, then the owner of the Rietzel patent, that such limitation was an admission that the spot welding of plates or sheets of more than two millimeters in thickness was NOT of Harmatta's invention and, consequently, an admission that the broader claims made for Harmatta and involved in the interference were claims that Harmatta was not entitled to make and to which he had made no oath of invention. (See brief of Rietzel, Rec., p. 1860.)

This contention was overruled, with the result that, as above indicated, the patent issued to Harmatta without any limitation as to the process or method being confined to the union of plates or parts of any specific thickness. We make mention of this matter here, to show upon what a narrow basis the alleged invention of Harmatta was once supposed by plaintiff's predecessor to stand.

However, all that may now be urged as to the adaptability of the Harmatta process to the union of extremely thin and flexible sheets of metal is quite beside the mark, since the matter in controversy is a process applicable, broadly, to plates or pieces of whatever thickness.

Moreover, the processes disclosed in the prior patent to Thomson, Lemp, Benardos, Burton, and others, are stated to be specifically applicable to the union of

thin sheet metal plates. This is especially true of Thomson, who, in his patent, No. 496,019, speaks of the use of his apparatus to unite *thin* tinned iron plates (Rec., p. 1055), and of Benardos, who in his patent says his "process may serve to directly weld together relatively *thin* metal sheets," etc. (Rec., p. 1152.)

Character of Current

Harmatta nowhere specifies the kind of current he intends to employ. It is *assumed* that he contemplated using a current of large quantity and low tension, as such a current is proper for welding.

Thomson, Robinson, Kleinschmidt, Burton and Benardos were, however, careful to tell us the kind of current they employed, being in this respect specific, where Harmatta is silent.

Electrode Materials

Harmatta nowhere tells us of what materials his electrodes—whether pin or roller—are to be made—whether of high or low resistance substances. If for the practice of, so-called, spot welding, necessity exists for the use of electrodes of any given material, he does not disclose it.

If necessity exists for the use of electrodes of relatively low resistance, instead of relatively high resistance, he does not disclose it. If necessity exists for the employment of electrodes whose resistance bears any special relation to the resistance of the parts to be united, he does not disclose it. If necessity exists for the use of electrodes that do not heat or heat much he does not disclose it. If necessity exists for effecting the welding by heat developed by the internal resistance of the parts to be united alone, instead of partly

in the electrodes themselves, he does not disclose it. If necessity exists for effecting the welding by heat developed principally at the joint between the parts to be united, he does not disclose it.

If the welding of metal plates can be effected by the use of electrodes of relatively high resistance (and the Thomson patent, No. 496,019, the Benardos patent, No. 50,909, the Stanley patent 1,176,614 and the uncontradicted tests of Mr. Dyer demonstrate that it can) (Rec., pp. 565, 601, 613), then the Harmatta patent hasn't a leg to stand on, for it gives no indication of any particular resistivity, relative or otherwise, and, in the absence of any directions on this subject, the use of all electrode materials must be held to be within the scope of the disclosure.

The above observations have relation to the disclosure of Harmatta's application as originally filed, which, alone, he swore to, as embodying what he claimed to be his invention. Any substantive matter introduced afterward by amendment and without his sanction and oath is, of course, without value.

The folder found opposite this page is inserted to illustrate, graphically, the relative resistances and conductivities of the electrodes and of the work in the Thomson patent No. 496,019, the Benardos German patent, the Harmatta French patent, the Stanley patent, and in the Harmatta U. S. patent in suit. It will be seen that where electrodes of high resistivity and low conductivity are used to weld plates of lower resistivity and higher conductivity, the disclosures of Thomson (Fig. 7) and of Benardos and of Stanley correspond, and that where, on the other hand, electrodes of low resistivity and high conductivity are used to weld plates of higher resistivity and lower conductivity, the disclosure of Thomson (Fig. 22) and of Har-

matta French patent, with iron or copper electrodes, and of Benardos, correspond. It will also be seen that the resistivity and conductivity of neither electrodes nor plates are given in the case of the Harmatta U. S. patent, the materials of these parts being undisclosed in the patent.

Materials to Be United By Welding

Turning to the original application of Harmatta, as filed, we find that he refers to the welding of "metal articles of all kinds in particular those of thinner sheet metal"; to "two metal sheets of equal thickness"; to "two sheet metal or other bodies"; to "sheets of metal only at particular places"; to "two superposed sheet metal ends"; to "thin vessels which are required to stand great pressure"; to "objects to be welded." But he nowhere tells us what kind of sheet metal he proposed to weld.

The absence of any particular designation in this regard would seem to indicate that the welding of all kinds of sheet metal would fall within the scope of his conception. This would, of course, include sheets of tin or of tinned iron. If sheets of either of these materials (which are of low fusibility) were employed, then electrodes of graphite or carbon, such as suggested by Benardos, in his patent 50909 or by Thomson in his patent No. 496,019, would suffice to fuse the surfaces of the sheets at the points of contact and result in perfect welds, and would fall within the claims in question.

In this connection, it is to be noted that in the Harmatta (Egel) French patent of October 13, 1903 (Rec., p. 1140), the welding of sheets of tin (tinned iron) is thrice referred to, and no other metal is mentioned as follows:

Original (p. 1141)

"Ansi que le montre la fig. 1, on introduit les deux corps metalliques (*fer-blanc* ou autre) dont les extremites se recouvrent, entre les deux electrodes a b."

Translation (p. 1145)

"As shown in Fig. 1 the two metallic objects (*tin* or the like) are introduced with their ends overlapping between the two electrodes *a* and *b*."

Again,

"Si alors on amene, par example, deux extremites de *fer-blanc* qu'il s'agit de souder et quie se recouvrent reciproquement entre les electrodes," etc.

"If then, for example, two ends of sheet *tin* which are to be welded and which overlap each other, are placed between the electrodes," etc.

And, again, in claim 2, as follows:

(p. 1142)

"2° Deux electrodes en ferme de galets, tenons ou autres, entre lesquels on introduit les objets a souder (*fers-blancs* ou autres), dont l'une puet etre raprochee ou ecartee de l'autre au moyen d'un levier, excentrique ou autre dispositif, actionne par une cremaillere ou autre dispositif."

(p. 1146)

"2. Two electrodes in the form of rollers, pins or the like between which are introduced the objects (*sheet tin* or the like) to be welded, one of which electrodes may be approached towards or separated from the other by means of a lever, eccentric or other device, actuated by a rack or other means."

The term "fer-blanc" occurring in the text of the French patent (ibid, pp. 1141, 1142) has been rendered "tin" by Mr. Coombs in his translation (Rec. pp. 1145, 1146). It really means tin plate or tinned iron;

but in common parlance, we refer to tin plate or tinned iron as "tin." For example, we speak of tin plates, tin cups, to designate tin-coated iron plates or cups; or we say "tinned goods," meaning food put up in so-called "tins," e. g., receptacles made of tin-coated or tin-plated iron.

The French word for pure tin is "etain."*

It is certainly very significant to find the French patent specifically mentioning tinned iron only, as the material proposed to be welded, since it indicates that electrodes of relatively high resistance, such as indicated by Thomson in his patent No. 496,019, or by Benardos in his patent No. 50,909, would be competent to carry out, and be well within, Harmatta's conception.

On the sound principle of patent law, that what would be an infringement, if later, would be an anticipation, if earlier, the Harmatta claims clearly cover, and just as clearly are anticipated by, the disclosure of the Thomson patent No. 496,019, which shows iron electrodes or carbon-faced copper electrodes, employed to electrically weld the tin-coated iron plates mentioned by Harmatta.

We do not, of course, know what the fact was, but we venture the suggestion that the two machines that were imported from Berlin, in 1905, by the National

*"*Heath's French Dictionary*," D. C. Heath, Boston, 1903. Tin, n. (Chem.) étain; (sheet iron coated with tin) fer-blanc.
Fer-blanc N. M. (-s-s) tin, tin plate, latten.
"*Mothes' Dictionnaire Technologique*," Wisbaden, 1874. Etain—tin. Fer-blanc m.—tinned iron-sheet, tin plate.
"*Spiers & Surrennes* French and English Pronouncing Dictionary," S. Appleton, N. Y. 1915. Fer-blanc n.m.—tin plate; tin; latten.
"Clifton & Grimaux," Library Garnier, Paris, 1914. Fer-blanc s. m.—tinned iron; tin-plate; tin; a thin plate of iron coated with tin.

Enameling & Stamping Co., were procured, primarily, for the purpose of welding tinned iron.

Mr. Knapp, the Director General of the company, testified that "The ordinary welding in a tin factory is just as *strong* as the ordinary riveting that has been done heretofore" (Rec., p. 128, X-Q. 55); but he then went out of his way to take a slap at the welding of tin ware, saying:

> "To weld tin ware it makes a black spot and burns the tin and in sheet iron or sheet steel it does not make that spot. The extreme heat at which welding is done does not interfere at all, where it would burn tin." (*Ibid*, p. 128, Re-D. Q. 57.)

It may be that in the welding of tin ware, when unskilfully done and without a proper regard to the strength of current used, the work might sometimes, as Mr. Knapp suggested, show a discoloration, but that would affect the appearance and not the strength of the weld.

When Mr. Knapp went out of his way to criticise the welding of tin ware, he evidently had not heard of the Harmatta French patent, and, therefore, did not know he was condemning the only specific application of electric welding—the welding of tinned iron—to be found in any of the Harmatta disclosures!*

---

*The spot welding of sheets of tin or of tin-coated iron presents no difficulty.

In the standard publication entitled, "Electric Welding," by Hamilton & Oberg, under the title "Spot Welding," occurs the following statements (p. 95):

> "Tin can be welded to tin or to sheet iron, but the stock will be discolored at the weld (p. 97)."
>
> "In welding brass, galvanized iron, tin, terne plate, German silver, aluminum, sherardized steel and all coated materials, it is advisable to use less pressure between the electrode points (p. 98)."
>
> "In welding tin, lead, or zinc-coated iron, both the upper and lower electrodes are pointed."

See also mention of tinned ware in agreement with Silesia Company, Rec., p. 433.

Mr. Gravell, plaintiff's expert, admitted the accuracy of these statements (Rec., p. 193, X-Q. 35).

Mr. McBerty has made and offered in evidence specimens of spot welding showing the practicability of spot welding tinned iron plates by both copper and steel electrodes (Rec., pp. 1014, 1015).

Extrusion of Metal

Realizing the straits in which it finds itself, plaintiff has endeavored, through its experts, to build up a theory of difference between the process or method involved in the welding of plane-faced plates and that involved in the welding of plates, like those of the Rietzel patent, in which one or both of the plates is or are provided with slight projections, founded upon what plaintiff is pleased to call the "extrusion of metal."

The theory has nothing substantial to support it. If there is extrusion of metal in one case, there is also in the other; but in any case it is negligible. The probabilities are that there is always and inevitably a slight extrusion of metal, if by extrusion we mean the lateral displacement of the metal at the point of fusion or welding under the pressure applied by the current-carrying pressure electrodes (Dyer, Rec., pp. 580, 586, 605).

Suppose we wish to weld a very thin metal plate provided at intervals with very small, short projections, or protuberances, to another metal plate having a practically plane face, as suggested by the Rietzel patent (Fig. 3). If, now, we lay these two plates together with the small projections or protuberances of one resting against the plane face of the other and then clamp them between two current carrying elec-

trodes with sufficient force to produce intimate pressure at the places of contact between the plates, and then turn on the current, it is clear that when the heat generated at the places of contact becomes sufficient to raise the temperature of the metal at those places to the fusing or welding point, the continued pressure of the electrodes will permit them to approach slightly nearer each other and, in so approaching, cause, possibly, a slight lateral displacement or flow of the softened metal of the plane-faced plate, on the one hand, and of the projections or protuberances of the counter-plate, on the other. This lateral displacement in the case of very thin plates having very low projections or protuberances will probably be immeasurably small and, in any case, entirely negligible.

When Mr. Townsend, plaintiff's counsel, was describing the disclosure of the Rietzel patent, he wrote (Rietzel patent No. 928,701, p. 1, line 92, Rec., p. 1099):

> "In carrying out my invention the *localization* of the flow of *heating electric current* and of welding *pressure* to the desired spot or spots may be brought about in any desired way. One of the preferred ways is by providing between the meeting surfaces or portions of the pieces to be united suitable conducting projections or points at the spots of union, which projections or points carrying the heating electric current from one piece to the other are so located in the meeting surfaces and are so separated from one another that on the application of the welding pressure *the welded union resulting* will be *localized in the area of the opposed surfaces* and will be *substantially co-extensive in area with the restricted area of the path of the effective heating current.*"

This, from plaintiff's own camp, seems to contradict the idea of there being any material extrusion of

metal. If the "welded union" is "localized on the area of the opposed surfaces" and "substantially coextensive in area with the restricted area of the path of the effective heating current," there can be substantially no extrusion.

Suppose, now, we wish to weld together two very thin plane-faced sheets or plates of metal by means of, say, a flat electrode on one side and a pointed electrode on the other. If, in such a case, we lay the overlapped sheets of metal between the electrodes and then cause the electrodes to approach one another, the plates will be pinched between the electrodes and the pointed electrode will, to a slight degree, bend or strike up the metal of the sheet against which it bears and, in effect, form a projection thereon (Dyer, Rec., p. 585), and if current is now turned on and maintained till the temperature of the parts of the plates that are thus brought into contact by the action of the electrodes reaches the fusing or welding point the softened metal will permit the electrodes to still further approach which will doubtless cause the softened metal to be slightly displaced or extruded, laterally—not to a degree that is of any moment, but, theoretically, somewhat.

Professor Thomson, who was swearing as hard as he could for the plaintiff company, of which he is vice-president and director, was obliged, reluctantly, to admit that in spot-welding there is "a *slight* movement of the metal" and that only "*practically all*" of the metal is included in the weld, as the following from his deposition shows (Rec., p. 535):

> "Q. 41. Are you prepared to say that there is no extrusion of metal at all, in the sense in which you have used that term in the making of a spot weld, so-called?

"A. There is a *slight movement* of the metal, but it is not manifested as an extrusion. The plates appear after the welding slightly indented or practically flat. The indentation, of course, means that the metal has *moved* but *practically all* of the metal is included in the weld, framed around by the unwelded material which being on edge opposes a very high force in the *spreading*." (Italics ours.)

By "manifested," Prof. Thomson may have meant "could not be seen," which, of course, would be usually true, as the welds are between the plates and out of sight.

Mr. Gravel, plaintiff's expert and general "stop gap" (having been put on the stand for the plaintiff five or six times), also found it necessary to step very lightly in regard to there being no displacement or extrusion in spot welding, so-called.

He testified on cross-examination, the first time he was produced, as follows (Rec., p. 85):

"X-Q. 118. Assuming that in spot welding the electrodes are placed firmly against the superimposed plates with no current on and that then, while the pressure continues to be applied, current is turned on and maintained until a proper welding of the plates has been effected, and that the current and pressure are then removed, will not the aggregate thickness of the plates at the point of pressure and welding be less after the completion of the weld than before?

"A. There is a slight depression at the weld which would make the aggregate thickness slightly less.

"X-Q. 119. I take it that very slight decrease in thickness is due to the heat and pressure involved in the welding operation. Is that not so?

"A. Yes.

"X-Q. 120. What has become of that displaced metal which the heat and pressure have displaced?

"A. Sometimes there is noticeable upset around the tool which has created the pressure. The amount of depression is usually so slight *that it is very difficult to say what becomes of the metal.* The condition is very similar to pressing any piece of metal with a blunt tool, either the metal must be upset or condensed.

"X-Q. 121. In ordinary spot welding is the metal softer at the contact point between the plates than it is at the point of contact between the electrodes and plates?

"A. In all probability while the metal is in the hot condition the greatest heat is at the center of the plane surface which is in the process of welding, because heat is continually flowing from this hot place to the surrounding metal, which is relatively cold. As the degree of softness is the function of the temperature, it naturally follows that the softest part of the metal would be located on the surfaces of the sheets between the sheets at the center of the heated spot.

"X-Q. 122. And if there is any flowage of metal, due to compression, it ought to take place in the greatest degree where it is softest, that is to say, at the proximate faces of the plates, ought it not?

"A. This would be the case if the metal were not confined, but as the spot heated for welding is entirely surrounded by relatively cold metal, we can hardly think of the metal as flowing out or moving, except in so far as it is pressed strongly against itself, owing to the expansion due to the heating."

It is remarkable that a most careful examination of the original application of Harmatta fails to disclose any mention of the absence of extrusion of metal in the practice of his process or in any product or article that might result from the practice of his process.

But it is more remarkable still, that in the Harmatta patent itself, the final draft of the specification and claims for which was prepared by Mr. Townsend—the Thompson Company's expert-of-experts in specification writing—there is not the slightest allusion to extrusion or the absence of it or to anything akin to it, either in the description of the process or in the description of the product.

It is, therefore, perfectly plain that the present exploitation of "the extrusion theory" represents a belated attempt on the part of the plaintiff to advance a point of differentiation which does not exist, and which, if it did exist, would be insubstantial and negligible.

What would it matter, we beg to inquire, if there were a slight extrusion or flowage of metal laterally from the place of welding of superposed sheets of metal, whether such sheets had projections or plane surfaces? In either case, the places of welding would be out of sight and there could be no possible disfigurement of the work nor impairment of the welds, and, in either case, the process of so-called spot welding would be produced.

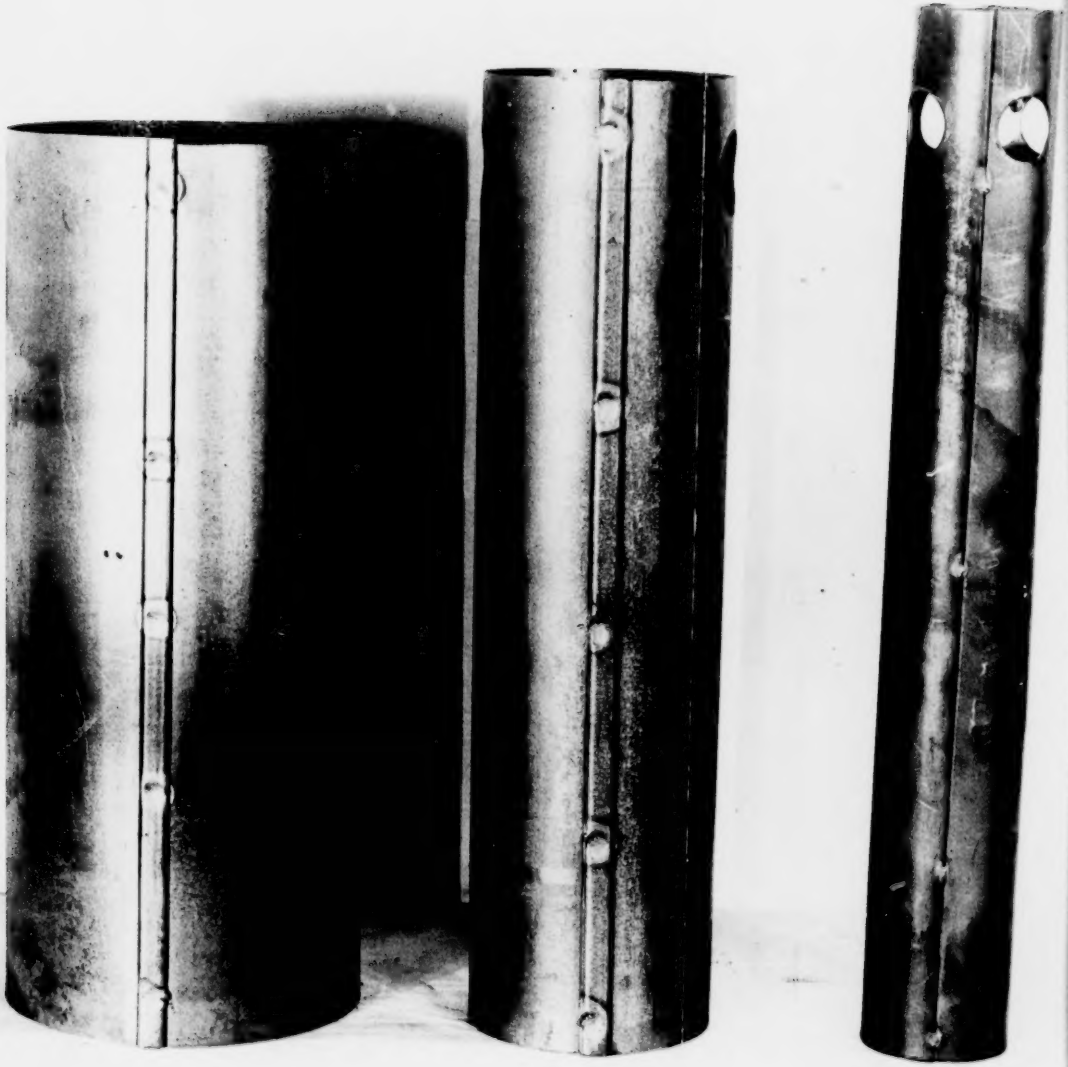
None of the claims of the Harmatta patent refers to extrusion of metal or the lack of it, and each is broad enough to cover a process or method of operation which would be practiced whether or not extrusion occurred. The plaintiff must stand or fall by the claims as made, and can neither add anything to them nor subtract anything from them.

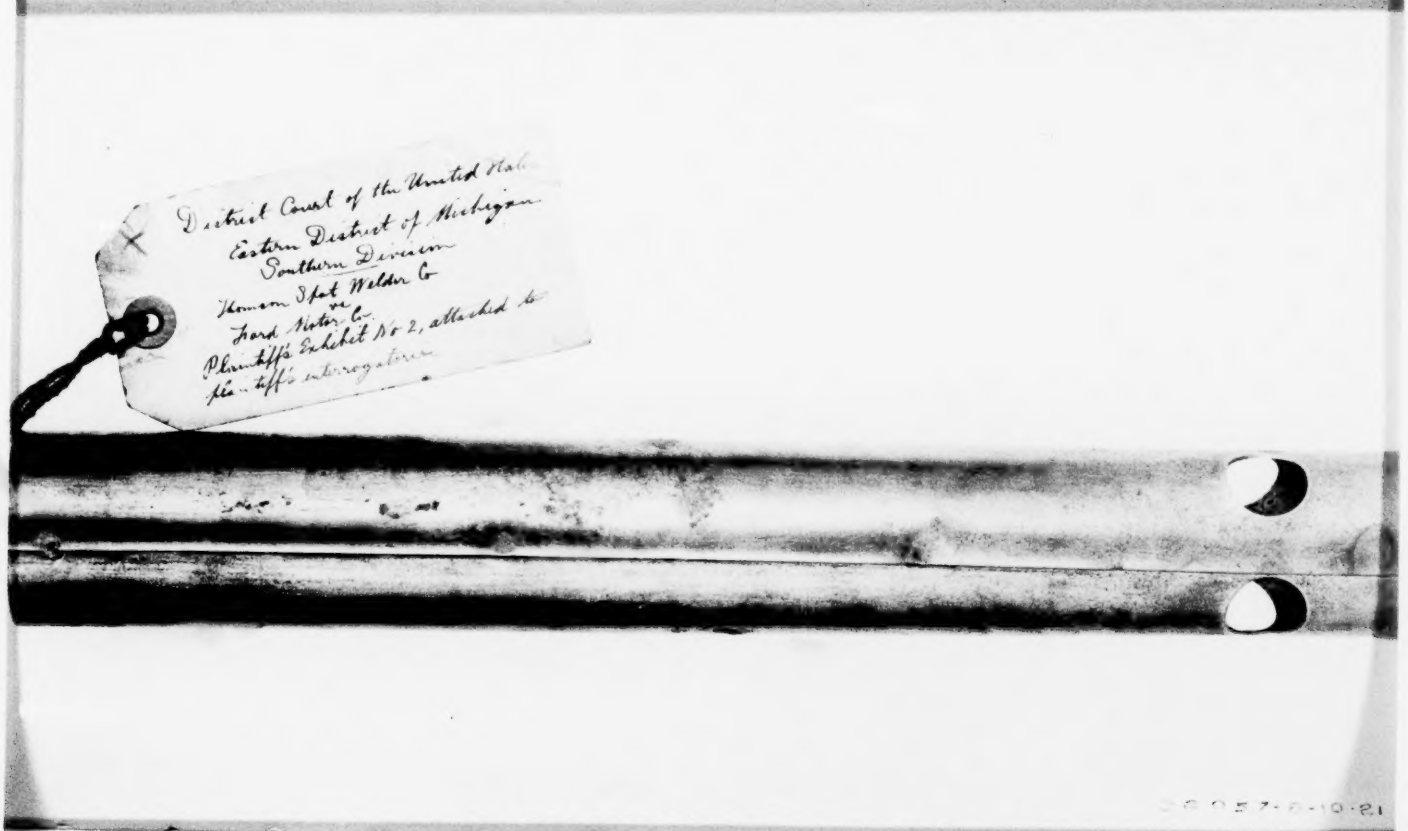
We repeat: The claims cover and were drawn to cover the welding of plates having pre-formed projections on one or both of them, such as disclosed by Rietzel, as well as the welding of plane-faced plates, and they are, therefore, anticipated and invalidated by the prior patents of Robinson, Kleinschmidt, de Ferranti and others.

If it is contended that any of them is limited to the welding of plates which have no projections on them, then that claim is anticipated and invalidated by the prior patents to Thomson, Lemp, Burton, Benardos and others, and is further invalidated on the ground that such a claim does not present a process or method that is substantially and patentably different from the process or method involved in the welding of plates provided with pre-formed projections.

The photograph opposite shows some of the practical applications of spot welding made at defendant's factory. It is a copy of Defendant's Exhibit No. 49, Dyer Photographs Sheet A-2, referred to by Mr. Dyer, in his testimony. (Rec., p. 584.) It will be noted that where the welds are made close to the edge of the lapped parts there is a slight lateral displacement or extrusion of the metal, but this does not affect the character of the weld nor involve any departure from the process employed to make it.

In this connection attention is called to the fact that in Plaintiff's Exhibit No. 2, attached to plaintiff's interrogatories, which is a spot welded muffler tube of defendant's manufacture and is claimed by plaintiff to support the charge of infringement, in this case, there are four welds indicated. (1) The first weld (next the perforations in the muffler) shows the impression of the pointed electrode about one-eighth of an inch from the edge of the overlapped top part and no extrusion of metal appears; (2) the second weld shows a slight extrusion of metal; (3) the third weld shows slightly more extrusion; and (4) the fourth weld shows much extrusion. A photograph of this plaintiff's Exhibit No. 2 is shown opposite.




District Court of the United Stat
Eastern District of Michigan
Southern Division
Homem Stat Welder Co
vs
Ford Motor Co
Plaintiff's Exhibit No 2, attached to
plaintiff's interrogatories

BECAUSE OF THE BREADTH AND INCLUSIVENESS OF THE HARMATTA PRODUCT OR ARTICLE CLAIMS THEY ARE ANTICIPATED AND INVALIDATED BY THE PRIOR PATENTS OF ROBINSON, KLEINSCHMIDT, BENARDOS AND OTHERS.

Interpreted as they must be, *in view of their origination in the Rietzel patent,* as covering and including products or articles formed from plates or parts one or both of which are provided with pre-formed projections, all of the product or article claims of the Harmatta patent must be held to be invalid in view of the prior patents to Robinson, Kleinschmidt, Benardos, and others.

The *Robinson Patent* No. 574,942, of January 12, 1897, not only shows and describes the welding of plates or parts, one of which has pre-formed separated welding projections, but, as we have seen, makes distinct claims for such subject-matter, as follows (Rec., p. 1074):

> "7. In a rail-joint, the truss or bottom plate B provided with the welding projections *d d*, with space between them, said projections being adapted to form several welding connections with the same rail, substantially as described.
>
> "8. In a rail-joint, a splice-bar constructed for welded attachment to one only of the abutting rails, said bar being provided with a plurality of welding projections grouped nearer to one end of said bar than the other, said projections forming a plurality of welding connections with the same rail, the portion of said splice-bar between said projections, and not raised to a welding heat, limiting the compression and regulating the predetermined relative position of said splice-bar and rail when welded together, substantially as described."

The characteristics of the Robinson structure set out in these quoted claims were urged by Prof. Thomson as peculiar to the Rietzel structure in an affidavit made by him and filed in support of the Rietzel application.

Prof. Thomson in that affidavit (verified November 30, 1908) said, among other things (Rec., p. 1784):

> "That in the invention of Mr. Rietzel aforesaid * * * the purpose is distinctly to limit the welding to a mere spot or spots, forming, in effect, a substitute union for that made heretofore, by perforating the plates at the spot or spots of union and then inserting a rivet and heading down said rivet."

Again (*Ibid*):

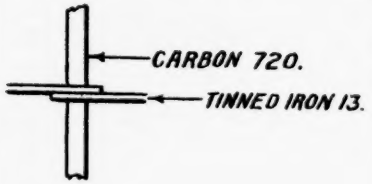
> "That in the Rietzel invention, in other words, the mechanical union of the plates is not over the whole area of the opposed or meeting surfaces, but at a number of isolated places which are, strictly speaking, spots, inasmuch as the welding portions of the plate form portions only of their meeting surfaces and are separated from one another over large areas by disunited portions, said disunited areas being anything desired consistent with the desired strength of the composite piece."

Again (*Ibid*, p. 1785):

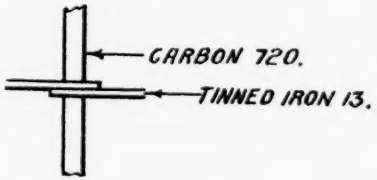
> "The spot welding as contemplated by the Rietzel invention is entirely different in conception and application and affords a welding substitute for a riveted union. There is no welding over the areas between the spots at which the heating current starts and in fact there may be such a want of contact and union over such areas *as to allow a liquid to leak through between the plates*, etc."

	Resistivity	Conductivity
COPPER	1.586	100.
IRON	8.85	17.9
IRIDIUM	6.1	26.
MAGNESIUM	4.35	36.2
TIN	13.0	12.2
PLATINUM	10.96	14.4
SILVER	1.46	108.
TUNGSTEN	5.57	28.8
CARBON	720.	

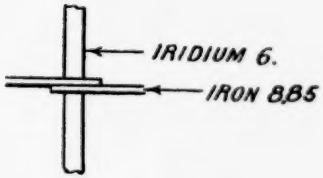
Thomson (1889)



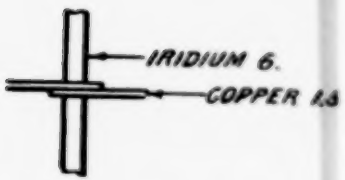
Benardos (1890)



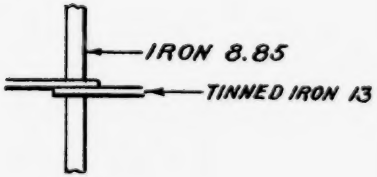
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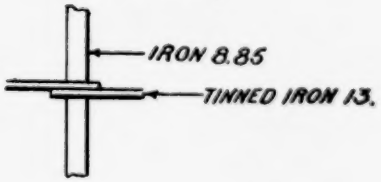
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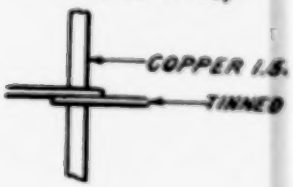
Thomson (1889)



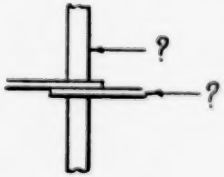
Harmatta French (Oct. 1903)



Harmatta French (Oct. 1903)



Harmatta U. S. (Dec. 1903)



Stanley (1916)



1.586

ch

1.586

ED IRON 13

EXPLANATION.

In this diagram, the illustrations in the upper line, reading from left to right represent, the first one in order, Fig. 7 of the Thomson patent 496,019, wherein the electrodes (carbon) are of relatively high resistance (720.) while the plates (tinned-iron) are of lower resistance (13.); the second, Fig. 2 of the Benardos German patent, wherein, also, the electrodes (carbon) are of relatively high resistance (720.) and the plates (assumed to be of tinned-iron) are of lower resistance (13.); the third, Fig. 2 of Benardos, wherein the electrodes (iridium) are of relatively low resistance (6.) and the plates (assumed to be of iron) are of higher resistance (8.85); the fourth, Fig. 2 of the Benardos patent, wherein the electrodes (iridium) are of relatively high resistance (6.) and the plates (assumed to be of copper) are of lower resistance (1.586); and the fifth, Fig. 4 of the Stanley patent, wherein the electrodes (tungsten) are of relatively high resistance (5.57) and the plates (copper) are of lower resistance (1.586).

The illustrations, in the second line, reading from the left represent, in order, first, Fig. 22 of the Thomson patent 436,019, wherein the electrodes (iron) are of relatively low resistance (8.85) and the plates (tinned-iron) are of higher resistance (13.); the second, Fig. 1 of the Harmatta French patent, wherein the electrodes (assumed to be of iron) are of relatively low resistance (8.85) and the plates (tinned-iron) are of higher resistance (13.); the third, the same Fig. 1 of the Harmatta French patent, wherein the electrodes (assumed this time to be of copper) are of relatively low resistance (1.586) and the plates (tinned-iron) are of higher resistance (13.).

The illustration on the third or bottom line represents the electrodes and plates of Fig. 1 of the Harmatta U. S. patent, concerning which no hint is given either as to the materials or resistances employed.

We might here observe that the Robinson patent under consideration was not cited during the prosecution of the Rietzel patent application. The fact that it was classified among "rail joints" would account for the fact that it was overlooked by the Examiner.

The *Kleinschmidt Patent,* No. 616,436, of December 20, 1898 (Rec., p. 1077), affords another complete anticipation of the product or article claims of Harmatta. Kleinschmidt, like Robinson, had for his object the welding of splice-bars to the webs of railroad rails. His splice-bars were generally plane-faced, but each had a relatively low projection near each end and a third low elongated projection extending across the face of the bar, at the middle.

To secure the splice bars to the webs of the rails the bars were first clamped to the webs, with their isolated projections against the latter, by means of electrodes, and the welding current was then turned on and maintained till the union was complete.

There were large areas of unwelded union between the welded projections.

This Kleinschmidt patent was likewise overlooked and not cited to Rietzel.

The prior *Benardos German Patent,* No. 50,909, of May 8, 1889 (Rec., p. 1148), affords another complete anticipation of the product or article claims.

In considering this Benardos patent, in its application to such product or article claims, it is, of course, immaterial by just what process or by what form of apparatus the Benardos product is produced, so long as the product, as such, is the same as Harmatta's.

If we take the apparatus of Fig. 2 of Benardos, place two overlapped metal plates between the electrodes, clamp the plates by means of the electrodes and turn on the current, as directed, the result will be the weld-

ing together of the plates at the spot or spots treated and the production of a product or article that answers the call of the Harmatta claims. And this will be true, whether the greater portion of the welding heat is generated at the contacting surfaces of the two plates, in the plates themselves, in the electrodes or in all of these places. This Benardos German patent was also not cited to Rietzel.

The product of the *Thomson Patent,* No. 396,015 (Rec., p. 1038), answers the terms of the Harmatta product claims for, in addition to the union of the plates by rivets, electrically set, the plates themselves are welded in spots.

The sixth claim of the patent makes this clear:

> "6. The herein described method of fastening two pieces of metal together, consisting in passing a heating current through a rivet or rivet blank passing through the pieces, *as well as through the pieces of metal themselves in the neighborhood of the rivet,* and applying pressure to set the rivet and weld the pieces together."

So, with the product of the *Thomson Patent,* No. 444,928 of January 20, 1891 (Rec., p. 1048), overlapped pieces to be welded when subjected to the action of the roller electrodes which apply both pressure and current, will inevitably be converted into a product falling within the terms of the Harmatta claims.

The Thomson patent says (p. 1, line 84):

> "The edges are slightly overlapped, as shown, and the plates, being in position between the rolls, may be squeezed together by means of the screw S, thus forming an electric contact between them. The electric current being now turned on as it passes from one roller to the other and across *the*

point of pressure will heat the work to the welding temperature and soften the same slightly, after which the screw may be driven a few more turns to effect a solid union.

"The work, *having been thus started,* may now be moved along through or between the rollers, *so as to bring successive parts of the joint* into position to be pressed and heated at the same time."

The *Lemp Patent,* No. 553,923 (Rec., p. 1067), affords another example of a product which falls within the terms of the Harmatta claims.

This patent is even a better reference than the Thomson patent last above considered, since, if there is anything material in the point, the roller electrodes of Lemp indubitably *do not,* in their position of operation upon the overlapped or superposed plates, extend way across the overlapped or superposed parts, *but only part way across.*

The *Thomson Patent,* No. 496,019 (Rec., p. 1055), which shows and describes the electrode welding of tin-coated iron plates, affords still another example of an anticipating product.

Other illustrations of products or articles answering the terms of the claims are found in the *Burton Patent,* No. 647,694 (Rec., p. 1079); the *Perry Patent,* No. 670,808 (Rec., p. 1083); the *Parkinson British Patent,* No. 14,836 of 1894 (Rec., p. 1112), and the *de Ferranti British Patent* of May 25, 1903 (Rec., p. 1122). The trial court and the Circuit Court of Appeals, in their written opinions, discussed with fullness the prior art patents above specifically referred to and concluded that they rob the Harmatta disclosures of both process and product of any patentably novelty (pp. 27-36, 2089).

BY THE CONDUCT OF PLAINTIFF'S PREDECESSOR IN TITLE, PLAINTIFF IS EQUITABLY ESTOPPED TO ASSERT HARMATTA'S PRIORITY OVER RIETZEL.

On the 24th day of February, 1905, Adolph F. Rietzel, of Lynn, Mass., then the superintendent, engineer and general manager of the Thomson Electric Welding Company, plaintiff's predecessor, for and in behalf of his company, made application for a United States Patent for what was characterized as "Improvements in Uniting the Component Parts of Composite Sheet-Metal Structures."

In this application, as originally filed, it was stated (Rec., p. 1723):

> "My invention relates to a method of forming an electrically welded union between the plane surface of a piece of metal and another piece of metal and is especially useful in uniting *two plates or sheets of metal at their plane surfaces.*
>
> "One of the special objects of the invention is to provide a method whereby a sheet of metal, especially in the thinner gages, may be united on its plane surface to another sheet or to any other piece of metal. For the sake of illustration, however, the process will be described as carried out in uniting two sheets or plates to one another, for which purpose the invention is particularly useful. It is to be understood, however, that I do not limit myself to the process as applied to sheet or plate metal or to uniting two plates or sheets with one another, since the invention is also applicable to forming a welded union with a plane surface or contact surface of considerable area in a piece of metal of any form.
>
> "It is not practicable by the present process of electric welding to weld together two plates or sheets of metal on their plane surfaces, on ac-

count of the large area of surface contact between them, when laid one upon the other, which allows the welding current to pass without bringing them up to a welding heat.

"My present invention consists essentially in providing over the surface to be welded a number of contact spots or points through which the welding current is passed in multiple and applying pressure in the proper way to form a number of distinct electric welds or spots of union over said surface.

"These contact spots act to localize the current and the heating to a welding temperature and may be provided either by casting, punching or indenting the metal of the plane surface with which the welded union is to be made, or otherwise forming the same so as to provide thereon a multiplicity of isolated projections, or said contact spots may be provided by disposing a number of small pieces of metal over said surface, which pieces become united with said surface and with the opposite piece or pieces of metal in the welding process."

In the drawings which accompanied and formed part of this Rietzel application there were shown several applications of the idea of welding in spots (Rec., p. 1827).

According to Fig. 1 a plate provided with a number of separated struck-up projections was to be united to a plane plate.

Fig. 2 showed two plates with struck-up projections that were adapted to be united at the projections.

Fig. 3 showed a plate with projections cast or formed wholly on its inner face in co-operation with a plane faced opposed plate.

Fig. 4 showed two co-operating plates provided with projections like those of the plate with projections in Fig. 3.

Fig. 5 showed two plane plates with interposed separate pieces of metal through which the welding was intended to take place.

In the application, as filed, there was no specific mention of the welding together of two perfectly flat plane plates in spots, *though, as we shall, later on, see, Rietzel had long before that time done work of that character at the Thomson Electric Welding Company's shops, at Lynn, Mass. When the application was filed Reitzel and his counsel evidently thought there was no novelty in such an application of resistance welding, or else that Reitzel's public use of it had barred his right to a patent.*

Perhaps the broadest claim that was presented with the application, as filed, was the eighth, which read as follows (Rec., p. 1728):

> "8. The herein described method of electrically welding a piece of metal at a plane surface thereof consisting in providing such plane surface with a current localizing projection, passing a heating current through such projection and applying pressure to unite said piece with another piece by a welded union coincident with such projection."

On June 8, 1908, the Primary Examiner, having already rejected the Reitzel application and an appeal to the Board of Examiners-in-Chief having been taken from such rejection, found a new anticipating reference, namely, British patent to Harmatta, No. 22,981 of 1903. In his letter to applicant, he said (Rec., p. 1760):

> "The Examiner proposes to direct the attention of the Board of Examiners-in-Chief to the British patent to Harmatta, 22,981 of 1903, Class

> 219, Welding (see Fig. 4 and lines 32 and 33, page 5), as additional ground for the rejection of claims 1, 3, 4 and 6. Fig. 4 of this patent shows a spot weld, which takes the place of a rivet, and it is not considered to be a patentable improvement to join two sheet metal plates by a number of such 'spot welds.' "

So far as this record shows this was the first time the British patent, or any patent, to Harmatta had been brought to the attention of Reitzel, or to the Thomson Electric Welding Company, his assignee. So straightway, to wit, on November 24, 1908 (Rec., p. 1762), the Rietzel application was amended and broadened so as to cover the Harmatta disclosure of electrically welding plane faced plates having no preformed projections upon them (Rec., p. 1130).*

This amendment took the form of a complete new specification and claims, the latter being expanded in number to twenty-three. The process of Rietzel was now no longer said to consist "*essentially* in providing over the surface to be welded a number of contact spots or points through which the welding current is passed in multiple," as in the original, but was characterized thus (Rec., 1762):

> "Briefly stated, the invention consists in electrically welding pieces together in a spot or spots definitely located in and involving a portion only of their meeting surfaces as hereinafter more particularly described and claimed."

And the product of the Rietzel process was characterized thus (*Ibid.*, p. 1763):

*See Townsend testimony, Rec., p. 622, et seq.

"A weld formed according to my invention is distinguished, however, from such prior welds by the fact that a portion only of the opposed surfaces is welded together, such portions being coincident with and limited to spots in the areas of such opposed surfaces in which spots the heating electric current is localized or confined in any desired way so that the major portion of the opposed surfaces will not be involved in the welding, although they may, after the completion of the operation, lie in contact with one another or very close together."

Of the twenty-three new claims presented the following are typical (*Ibid.*, p. 1769):

"1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at a spot or spots only of their juxtaposed or opposite faces.

"2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well-defined areas of no union, consisting in applying pressure localized at the spots of desired union, passing electric current through the pieces from one to the other, and confining the flow of current to said spots until the union is effected.

* * * * *

"6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well-defined and comparatively extensive area of no union completely surrounding said spot.

* * * * *

"16. Composite metal work, having its component pieces welded together at one or more spots

localized on their meeting surfaces or portions so as to be separated from one another on said meeting portions by distinct areas which are unwelded.

"17. Metal plates fastened together at their meeting portions by a number of distinct or isolated welds formed at spots of such restricted area and so separated from one another that when welding electric current is passed from one to the other at said spots, the metal between the spots will not be brought to plastic or welding condition."

It can not be doubted that this new amended description and these new amended claims were aimed specifically at, and intended to include, cover and subordinate, the disclosure of the Harmatta British patent. The attorney who did the work—Mr. H. C. Townsend, of New York—was a pastmaster at patent drafting, was thoroughly skilled in the art of electric resistance-welding and was, in fact, the one who drew the original Thomson "Art" patent. But something had to be done to get rid of the Harmatta British patent as an anticipation of Rietzel, and to establish Rietzel's priority over Harmatta.

Rule 75 of the Patent Office provides as follows:

"75. When an original or reissue application is rejected on reference to an expired or unexpired domestic patent which substantially shows or describes but does not claim the rejected invention or on reference to a foreign patent or to a printed publication, and the applicant shall make oath to facts showing a completion of the invention in this country before the filing of the application on which the domestic patent issued, or before the date of the foreign patent, or before the date of the printed publication, and shall also make oath that he does not know and does not believe that

> the invention has been in public use or on sale in this country, or patented or described in a printed publication in this or any foreign country for more than two years prior to his application, and that he has never abandoned the invention, then the patent or publication cited shall not bar the grant of a patent to the applicant, unless the date of such patent or printed publication be more than two years prior to the date on which application was filed in this country."

Now, it so happened that while the Provisional Specification of the Harmatta British patent was filed October 23, 1903 (Rec., p. 1124), the Complete Specification was not filed till July 25, 1904, not accepted till August 25, 1904, and not sealed till November 8, 1904.

The patent, therefore, really did not count, *as a patent*, under British law, till November 8, 1904, the day of sealing of the Complete Specification.

In order, therefore, to successsfully "swear back of" the Harmatta patent, it was necessary that Rietzel should "make oath to facts showing a completion of the invention in this country" * * * before the effective date of that patent, that is to say, before its date of sealing.

Such an affidavit or "oath to facts" was immediately prepared by Mr. Townsend and executed by Mr. Rietzel and filed, with the following statement (Rec., p. 1775):

> "We submit herewith substitute specification and claims in the above-entitled case, together with an affidavit of the inventor, making oath to facts showing a completion of the invention in this country before the legal date of the foreign patent to Harmatta, cited by the Examiner as an anticipating patent."

The affidavit of Rietzel referred to was as follows (Rec., p. 1778):

"County of New York, State of New York, ss.:

"ADOLPH F. RIETZEL, being duly sworn, deposes and says that he is the applicant who filed the above entitled application for patent; that some time in June, 1904, he successfully practiced the invention in said application by uniting two halves of a sheet metal pulley in an electric welding machine at the shop of the Thomson Electric Welding Co., in Lynn, Mass.; that the piece of sheet metal herewith attached and marked 'Specimen of pulley C. F. Tischner, Jr., * * * N. P.,' is a duplicate of one of the halves of the pulley to which he at that time applied the invention; that the contact points or projections formed in the sheet metal were in the first instance made by filing the metal to leave the contact points or projections, indenting not being available at that time, but that in subsequent operations in which his invention was employed the projections were made by indenting the sheet metal, and that the invention was frequently practiced by him successfully at the shop of said company on a standard welding machine; that in conducting the operations on such machines he employed a pair of contacts fitted in the jaws of the machine and formed at their outer ends so as to fit into the cup shaped portion of the halves of the sheet metal pulley to be welded, thereby supporting the two halves with the contact projections engaged with one another; the two halves being in contact by the projections while assembled in the machine, electric current was caused to pass through the two halves by the contact projections, and pressure was then applied in the usual way practiced in electric welding by the standard machine in which the operation in question was conducted; the operations above recited as conducted by him were uniformly

successful and demonstrated clearly that the invention was complete in all particulars, and that the said invention has been since practiced on innumerable occasions in substantially the same way for uniting pieces of sheet metal such as the halves of sheet metal pulleys of the form shown in the exhibit and of other forms and of other sizes, many of much larger size than that of the exhibit; that he does not know and does not believe that the invention aforesaid has been in public use or on sale in this country, patented or described in a printed publication in this or any foreign country for more than two years prior to his application and that he has never abandoned the invention.

ADOLPH F. REITZEL.

"Subscribed and sworn to by the aforesaid Adolph F. Reitzel before me this 23d day of October, 1908.

C. G. TISCHENER, JR.,
"(Seal) *Notary Public.*
"Notary Public, Kings County.
"Certificate filed in New York County."

Accompanying the amendment to the Rietzel specification and the affidavit of Rietzel referred to was a supporting affidavit of Prof. Elihu Thomson, as to the value of Rietzel's improvement. In this affidavit Prof. Thomson said (Rec., p. 1782):

"That he is familiar with the process of electric welding set forth in the above entitled application of A. F. Rietzel for uniting sheets of metal together by what has been known as the 'spot welding process' and which forms a practical substitute for the riveting of plates together or for other mechanical expedient for fastening them together face to face;"

Again, contrasting the Rietzel improvement with a prior invention of one Hunter, Prof. Thomson said (*Ibid.*, p. 1784):

> "That in the invention of Mr. Rietzel aforesaid, the object and essential operation are entirely different from that of the Hunter process or invention, for the reason that there is no purpose in the Reitzel invention of forming a lap weld continuous over the whole opposed surfaces of the sheet metal pieces, but on the contrary the purpose is distinctly to limit the welding to a mere spot or spots, forming, in effect, a substitute union for that made heretofore, by perforating the plates at the spot or spots of union and then inserting a rivet and heading down said rivet."

Again, referring to the exhibit filed with Mr. Rietzel's affidavit, Prof. Thomson said (*Ibid.*, p. 1786):

> "The accompanying exhibit marked 'Rietzel Exhibit No. 3, J. A. McManus, N. P.,' and also with my initials 'E. T.,' is a specimen of a lap welding made by forming initial projections at such distances apart that *cold metal* will be left between said projections and the union will be, therefore, by a line of separate welded points, etc."

On Dec. 14, 1908, the broad claim 1 introduced by the amendment of Nov. 30, 1908, and which read as follows (*Ibid.*, p. 1769):

> "1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at a spot or spots only of their juxtaposed or opposite faces";

was rejected on the French patents to Egel, Nos. 356,187 and 335,889.

Claim 2, also, then standing in the case, read as follows (Rec., p. 1769):

"2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots, separated from one another by well defined areas of no union, consisting in applying pressure localized at the spots of desired union, passing electric current through the pieces from one to the other and confining the flow of current to said spots until the union is effected."

Regarding this claim the Commissioner in his letter of rejection said (*Ibid.*, p. 1788):

"Claim 2 is objectionable because the expression, 'Confining the flow of current to said spots,' *implies the use of apparatus such as a pointed electrode.* The claim is, therefore, misleading as applied to the method described by applicant. A similar objection is made to the expression, 'Localizing the pressure in and confining the flow of current' in claim 4; 'localizing the heating current' in claim 7; 'Confining the welding area of such current' in claim 8, and 'Confining the area of heating' in claim 14.

"Claims 2 to 7, inclusive, are rejected on either of the French patents cited above."

These French patents were founded on a communication from Harmatta himself, Patent No. 336,187, being a substantial copy of the Harmatta application as originally filed in this country and in Great Britain. Compare drawings of Egel (Rec., p. 1143), and translation of specifications, (*Ibid.*, p. 1144), with original U. S. Harmatta application (Rec., p. 1156, *et seq.*,) and Harmatta British patent, (Rec., p. 1124).

That a disclosure of these French patents did, in fact, emanate from Harmatta is shown by Harmatta's oath appended to his U. S. application, in which he so states (Rec., p. 1364), and by Harmatta's oaths to

three preliminary statements that he subsequently filed in interference cases in which his U. S. application was involved (Rec., p. 1846; *Ibid.*, p. 1914; Rec., p. 1473).

On March 13, 1909, Rietzel struck out his amended claim 1, last above quoted, and filed a substitute for it, reading as follows (Rec., p. 1796):

> "1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots."

At the same time, the specification was further amended by the addition of the following paragraphs, among others (*Ibid.*, p. 1795):

> "Briefly stated, the invention consists in electrically welding pieces together in spots definitely located in and involving a portion only of their meeting surfaces, by the application of pressure and heating current localized in such spot or spots."

Again (*Ibid.*, p. 1796):

> "A weld formed according to my invention is distinguished, however, from such prior welds by the fact that the opposed surfaces are welded together in spots only, the heating electric current being localized or confined in any desired way to such spots so that the major portion of the opposed surfaces will not be involved in the welding, although they may, after the completion of the operation, lie in contact with one another or very close together."

With this new amendment was filed another antedating affidavit from Rietzel, under Rule 75, for the purpose of justifying the claiming by him of the process when worked out by the use of a pointed electrode and of "short-circuiting" the French patents which disclosed the use of such pointed electrodes the attorney's letter of transmittal stating (*Ibid.*, p. 1800):

> "We file herewith an affidavit establishing completion of the invention on applicant's part prior to the dates of the French patents cited by the examiner in his last official letter."

It is interesting to note, at this point, that the first oath filed by Rietzel, under Rule 75, for the purpose of overcoming the effect of the British patent, only undertook to carry his date of invention back to "sometime in June, 1904," and referred to the successful completion and reduction to practice at that time of that embodiment of his spot welding invention which consisted in the welding together of plates having pre-formed projections through which the welding in spots took place.

That first affidavit was, therefore, insufficient to meet the case of the later cited French patents because the work of Rietzel set out in such first affidavit was alleged to have been done in June, 1904, whereas, the first of the French patents was published on *February* 18, 1904 (Rec., p. 1136), or four months earlier; and, further, because Rietzel apparently could not truthfully say he had successfully worked out his method of welding through projections before June, 1904.

When we come, therefore, to examine the second Rietzel affidavit, we find that in it Rietzel swore that

prior to the 18th day of February, 1904 (but how long prior he did not state nor have to state), he had successfully and repeatedly welded together sheets of metal face to face, *by the use of a pointed current-carrying electrode applied to one side of the superposed plates and a flat electrode applied to the other side;* or, in other words, he swore to the successful practice by *him* of the identical application of the electric resistance process of welding together plane-faced metal plates by means of a pointed electrode disclosed in the Harmatta British and French patents, *prior* to the effective dates of those patents.

The second Rietzel affidavit, in full, is as follows (Rec., p. 1791):

> "County of New York, State of New York, ss.
>
> ADOLPH F. RIETZEL, being duly sworn, deposes and says, that he is the applicant that filed the above entitled application for patent;
>
> That prior to the 18th day of February, 1904, he repeatedly successfully practiced the method of fastening two sheets of metal together face to face by welding them at spots in their meeting surfaces by confining the heating electric current passed from one plate to the other in such spots and localizing the welding pressure at said spots, as claimed broadly in said application;
>
> That the work of so uniting such sheets of metal was done at the factory of the Thomson Electric Welding Company at Lynn, Massachusetts, on a welding machine of a commercial type known as type 10 A Welder;
>
> That said machine was the same in construction as the machine known as type 5 A Welder, but of larger size, and was identical with that shown on the attached page removed from a catalogue of the Thomson Electric Welding Company, which page is identified and marked 'Page of Catalogue, D. M. Edsall, N. P.';

That the accompanying pieces of work marked 'Specimen No. 1, D. M. Edsall, N. P.' and 'Specimen No. 2, D. M. Edsall, N. P.,' are duplicates of work so done by him on that machine prior to the 18th day of February, 1904, but that the original specimens were not preserved;

That in doing such work he employed a pointed electrode, the same in form as the accompanying electrode marked for identification 'Welding Electrode, D. M. Edsall, N. P.,' which electrode was clamped in one of the holders of the machine and was used to apply the localized pressure and heating current to the plates which were welded together at spots in their superficial area, the opposite or backing electrode being a block of metal which was flat and of a superficial area, approximating the area of the plates which were welded together and which opposite electrode was clamped in the opposite holder of the machine;*

That in this operation the two plates superposed upon one another were inserted between said electrode and the pressure and heating current localized as claimed were applied by forcing the pointed electrode against the outside face of the plates and pressing them between said pointed electrode and the opposite flat electrode, current being at the same time passed from one electrode to the other and pressure being applied by employing the usual devices forming a part of the machine and used in the ordinary operation of the machine for applying welding pressure to the work;

That the work was repeatedly and successfully done in this manner upon various sizes and pieces of metal plates, none of which, however, are now in existence so far as affiant has been able to discover;

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*The specimen of work and the welding electrode filed with this affidavit have been diligently searched for at the Patent Office but cannot be found. (See Friess, Rec., p. 708.)

That the work done by him aforesaid, demonstrated the complete success of the operation and that metal plates could be successfully and firmly united together by distinct or isolated electric welds forming welded spots of union in their meeting faces and constituting in effect a successful substitute for a union of the same by a number of rivets.

ADOLPH F. RIETZEL.

Subscribed and sworn to before me this 18th day of February, 1909.

DAVID M. EDSALL,
(Seal) *Notary Public, N. Y. Co.*"

The Harmatta British and French patents having been thus disposed of as references, the attorney for the Thomson Company proceeded further to broaden the Rietzel application by inserting the following in the specification (*Ibid.*, p. 1806):

"The product in the form of sheet metal is further particularly useful for sheet metal ware since the outer or exposed surface of the metal will have the smooth and practically unaltered finish of sheet metal and said surface will not be substantially marred when the process is properly conducted, excepting for the presence of such infrequent small depressions as might remain from the previous indentation of the metal from the back when, as hereinbefore described, an indenting of the metal may be resorted to.

"The product in sheet metal also possesses the advantage that the spots of welding when located within the edges of the meeting surfaces will not show. The product is also superior to that produced by riveting of the plates in that there are no rivet heads to mar the finish of the back or outer surfaces of the metal."

Also, by adding the following product or article claims (*Ibid.*, p. 1807):

> "17. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.
>
> 18. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered, as and for the purpose described.
>
> 19. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spot, as and for the purpose described."

Later, on June 19, 1909, another product or article claim was added, reading as follows (*Ibid.*, p. 1814):

> "20. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points."

And then, on July 20, 1909, having been drawn by a master hand with reference to the early work of Rietzel in the electrode-welding of plane-faced plates, to Riet-

zel's later work in the welding of plates with projections, to the disclosures of Harmatta British and French patents, and to the practical up-to-date development of the art of so-called "spot welding,"* the Rietzel patent with twenty claims,—sixteen to process and four to product—was issued to the Thomson Company, as the assignee of Rietzel, and the whole practical art of "spot welding" was supposed thereby to have been delivered into the hands of the Thomson Company and left there completely at the latter's mercy!

But a curious and unexpected thing then happened. On April 14, 1910, like a bolt from a clear sky, came notice from the Patent Office to the Thomson Company that the issued Rietzel patent had been put in interference with a pending United States application of Harmatta, both as to process and product claims (Rec., p. 1819) and both parties were called upon to file their preliminary statements.

These preliminary statements, in interference proceedings, are in the nature of sworn pleadings, are strictly binding upon the parties and very difficult, indeed, of amendment.

In consequence, great care is required in their preparation.

The Patent Office rule regulating the matter is Rule 110, which reads as follows:

> "110. Each party to the interference will be required to file a concise preliminary statement, under oath, on or before a date to be fixed by the office, showing the following facts:

*Spot welding machines for the welding of plane-faced metal plates, face to face, were on the market in this country as early as 1906-8 (McBerty, Rec., p. 742; Taylor, Rec., p. 898; Rietzel, Rec., p. 638; Clark, Rec., p. 261).

(a) The date of original conception of the invention set forth in the declaration of interference.

(b) The date upon which the first drawing of the invention and the date upon which the first written description of the invention were made.

(c) The date upon which the invention was first disclosed to others.

(d) The date of the reduction to practice of the invention.

(e) A statement showing the extent of use of the invention.

(f) The applicant shall state the date and number of any application for the same invention filed within twelve months before the filing date in the United States, in any foreign country adhering to the International Convention for the Protection of Industrial Property or having similar treaty relations with the United States.

If a drawing has not been made, or if a written description of the invention has not been made, or if the invention has not been reduced to practice or disclosed to others or used to any extent, the statement must specifically disclose those facts.

When the invention was made abroad, the statement should set forth:

(a) That the applicant made the invention set forth in the declaration of interference.

(b) Whether or not the invention was ever patented; if so, when and where, giving the date and number of each patent, date of publication, and the date of sealing thereof.

(c) Whether or not the invention was ever described in a printed publication; if so, when and where, giving the title, place, and date of such publication.

(d) When the invention was introduced into this country, giving the circumstances with the dates connected therewith which are relied upon to establish the fact.

The preliminary statements should be carefully prepared, as the parties will be strictly held in their proofs to the dates set up therein.

If a party prove any date earlier than alleged in his preliminary statement such proof will be held to establish the date alleged and none other.

The statement must be sealed up before filing (to be opened only by the examiner of interferences; see Rule 111)*, and the name of the party filing it, the title of the case, and the subject of the invention indicated on the envelope. The envelope should contain nothing but this statement."

Now, the call of the sworn preliminary statement was quite different from the call of the affidavit under Rule 75, because, whereas, the affidavit under Rule 75 only required that the applicant should swear to facts showing a completion of the invention *prior* to the date of the patents set up in anticipation, the preliminary statement required that the *actual dates* respecting the conception and development of the invention should be set forth, with particularity. The Thomson Company, guided as it was by astute counsel, knew perfectly well that Harmatta's date of invention was as early at least as the date of the application for his British patent, i. e., October 23, 1903, since that patent had been formerly cited against Rietzel's application as an anticipation thereof and as a bar thereto; and it also knew that, under the International Convention (25 Sta. at L., 1383), and Section 4887 R. S. U. S., Harmatta could claim the benefit of his foreign filing date as the effective filing date of his application in this country, the Statute providing that:

*A similar statement repeating these declarations was later, to-wit, on Sept. 14, 1911, filed by Rietzel to cover a number of additional issues or counts added to the interference (Rec., p. 1917).

> "Sec. 4887. An application for patent for an invention or discovery or for a design filed in this country by any person who has previously regularly filed an application for a patent for the same invention, discovery or design in a foreign country which, by treaty, convention, or law, affords similar privilege to citizens of the United States, shall have the same force and effect as the same application would have if filed in this country on the date on which the application for patent for the same invention, discovery, or design was first filed in such foreign country."

And the Thomson Company further knew, and this is most important, that if it did not set up for Rietzel a date of invention earlier than October 23, 1903, a judgment on the record would straightway be entered in favor of Harmatta and against Rietzel by virtue of Patent Office Rule 114, which reads as follows:

> "114. If the junior party to an interference, or if any party thereto other than the senior party fail to file a statement, or if his statement fail to overcome the *prima facie* case made by the respective dates of application, such party shall be notified by the Examiner of Interferences that judgment upon the record will be rendered against him at the expiration of thirty days, unless cause be shown why such action should not be taken. Within this period any of the motions permitted by the rules may be brought. Motions brought after judgment on the record has been entered will not be entertained unless sufficient reasons appear for the delay."

Accordingly, to enable the Thomson Company to avert an immediate judgment against it, to obtain a "look-in," so to speak, in the interference, and to en-

able it to contest, at all, the question of priority of invention as between Rietzel and Harmatta, it caused to be prepared and sworn to by Rietzel a preliminary statement in which Rietzel declared (Rec., p. 1863)—

> "That he conceived the invention set forth in the declaration of interference during the latter part of October or first part of November, 1897; That, as near as deponent can at this time fix the date, the invention was successfully reduced to practice in the latter part of July, 1898, and at the same time was first explained and disclosed to others."

With the status thus acquired by the filing of this sworn preliminary statement, the Thomson Company proceeded, very leisurely, to occupy itself, not with the taking and submission of proofs as to Rietzel's electric welding operations in 1897-1898, but with the bringing of numerous technical motions to dissolve and the prosecution of many appeals challenging the patentability of the issues to Harmatta in view of certain admissions and disclaimers he was alleged to have made in the course of amendments to his application (Rec., pp. 1852, 1853), and challenging also the right of Harmatta to contest the interference because of the insufficiency of his oath to inventorship of the subject-matter of the issues (*Ibid.*, p. 1853), etc., etc.; the times for taking testimony in behalf of Rietzel being meanwhile extended, from time to time, under one pretext or another, so as to preserve that right.

On the 3rd day of February, 1902, nearly two years after the institution of the interference, the Thomson Company, through one of its counsel, Mr. Thatcher (a partner of Mr. Townsend), went abroad and procured from Harmatta an assignment of his pending appli-

cation (Rec., p. 1949), which, of course, gave the Thomson Company control of *both sides* of the interference, though, in form, Messrs. Townsend & Decker still appeared on the record as attorneys for Rietzel, and O. E. Duffy & Son as attorneys for Harmatta.

On May 10, 1912, these attorneys for the Thomson Company entered into a solemn stipulation again extending Rietzel's time for taking testimony (*Ibid.*, p. 1940), which was favorably acted upon by the Examiner of Interferences on May 13, 1912 (*Ibid.*, p. 1941), and Rietzel given until July 11, 1912, to take his testimony.

On July 15, 1912, no testimony having been offered in behalf of Rietzel, O. E. Duffy & Son made a solemn motion for judgment in favor of Harmatta because of the default of Rietzel to take testimony, which motion was duly and formally served on Townsend & Decker, attorney for Rietzel, and on July 24, 1912, the Examiner of Interferences entered an order to the effect that unless Rietzel should on or before August 3, 1912, show cause to the contrary, judgment would be entered against him (*Ibid.*, p. 1943); and, on the day last named, no cause having, of course, been shown, judgment of priority was entered against Rietzel and in favor of Harmatta and a limit of appeal fixed, as of August 27, 1912 (*Ibid.*, p. 1945).

It is interesting to note that Rule 125 of the Patent Office provides as follows:

> "125. After the interference is finally declared, it will not, except as herein otherwise provided, be determined without judgment of priority founded either upon the testimony, or upon a written concession of priority by one of the parties, signed by the inventor himself (and by the

assignee, if any), or upon a written declaration of abandonment of the invention."

The Thomson Company, being in control of the whole situation, doubtless figured that to offer testimony for Rietzel, or to file a concession of priority by him, or to file a declaration of abandonment by him might involve the relinquishment of some right. It wished to hold on to all that Rietzel had asserted to be his and at the same time secure new and further protection, for the same thing, through Harmatta.

So it simply suffered a judgment by default to go against Rietzel. It then proceeded to hold on to the Rietzel patent, with all its twenty (20) claims till *June 12, 1915*, nearly three years later, when it filed a disclaimer as to some of the claims.

Rietzel, himself, was kept in ignorance as to how the interference was being manipulated. He testified he was not advised as to the outcome of the interference, that he did not know judgment of priority had been entered in favor of Harmatta, nor, till put on the stand in this case, that a patent had been issued to Harmatta (Rec., p. 651, Q. 123, *et seq.*).

After the judgment in favor of Harmatta in the interference case became final, the Harmatta specification and claims were again rewritten and the patent was, on December 3, 1912, *just nine years, to a day*, after the application for it was filed, granted and issued to Thomson Electric Welding Company, as the assignee.

While, as we have seen, the Harmatta application was in adversary hands, and while the sworn representations made in the Rietzel preliminary statements that Rietzel was the prior inventor over Harmatta were staving off a judgment on the record against Riet-

zel and giving to the Thomson Company the potential right to contest priority with Harmatta, the Thomson Company was developing a licensing system under the Rietzel patent from which it was deriving profit by way of royalties from users of spot welding machines that electrically welded plane-faced plates; (Rec., p. 2019) was notifying and suing users of spot welding machines for welding plane-faced plates that such use was an infringement of that patent; was suing for infringement of that patent users of even what are alleged to be Harmatta spot welding machines (Rec., p. 1991; Rec., p. 227); and was, in fine, asserting the Rietzel patent to be a good, all-covering patent for all that it claimed.

The grounds upon which defendant bases its defense of equitable estoppel may, therefore, be summarized as follows:

(1) In the matter of the granting and issuing of patents the Commissioner stands as the agent and representative of the public at large.

(2) The plaintiff's predecessor in title, Thomson Electric Welding Company, when soliciting the grant of the Rietzel patent, represented to the Commissioner of Patents, through the affidavits of Rietzel filed under Rule 75, to its own advantage and to the prejudice of the public, that Rietzel had invented both the process of electrically welding plane faced metal plates as well as the process of electrically welding metal plates provided with pre-formed projections, and the products of those processes, *before* the dates of the Harmatta British and French patents; and, on the strength of such representations, and on that alone, the Commissioner granted the Rietzel patent, with claims including and covering the disclosure of Harmatta, and, so-called "spot welding," generally.

(3) When the Rietzel patent was subsequently put in interference with Harmatta's United States application plaintiff's predecessor in title, Thomson Electric Welding Company, through the two sworn preliminary statements of Rietzel filed by it on the 20th of June, 1910, and on the 14th of September, 1911, respectively, represented to the Commissioner the reduction to practice by Rietzel of the inventions of the processes and products involved in the interference as early as 1898 and the further assertion of the priority of Rietzel over Harmatta in respect of said processes and products, thereby, to its own gain and advantage and to the prejudice of the public, averting an immediate judgment of priority against the Rietzel patent,* giving the Thomson Company a "look-in" in the interference, and enabling it, through Rietzel, to contest priority with Harmatta, and also enabling it to employ the already granted Rietzel patent for a period of nearly three years and a half before the issue of the Harmatta patent (and for three years afterward and till a disclaimer was filed) as a title upon which to found a licensing system and under which to threaten and to sue users of electric spot welding machines, including even users of so-called Harmatta machines, for the welding of plane-faced plates.

(4) The truth or falsity of the representations made by the plaintiff's predecessor to the Commissioner has nothing to do with the efficacy of the estoppel urged. It is the *fact* of the representations, not their truth, and the *fact* that the Commissioner acted upon the representations to the prejudice of the pub-

*It is enough if a party has been induced to *refrain* from using such means, or taking such action, as lay in his power by which he might have retrieved his position and save himself from loss. *Pomeroy's Eq. Jur.*, Vol. II, p. 1444.

lic, first, by the granting and issuing of the Rietzel patent and thereby imposing upon the public a patent that would, otherwise, not have been granted; and secondly, by the withholding of judgment against Rietzel in the interference for a period of nearly three and a half years—which judgment would otherwise have been rendered at once—that present the essential elements of an equitable estoppel.

It is immaterial whether Rietzel did or did not, in 1898, before Harmatta entered the field, "successfully reduce to practice" the process of electric welding or the product of such process covered by the issues in the Rietzel-Harmatta interference (Rec., p. 1838; *Ibid.*, p. 1907) and by the claims of the Harmatta patent here in suit. The Thomson Electric Welding Company so represented the fact to be to the Commissioner of Patents in the affidavits under Rule 75, and in the two Rietzel sworn preliminary statements, and, now, when the plaintiff asserts the Harmatta patent against the defendant, and the defendant confronts it with the former solemn sworn representations of its predecessor in title declaring Rietzel's prior inventorship, it is manifestly unjust and inequitable that it be heard in this Court of Equity to deny that Rietzel was prior.

It is blowing hot and cold, with a vengeance, to assert at one time, when it serves its purpose, that Rietzel is the prior inventor over Harmatta, and to assert, at a later period, when its interest is different, that Harmatta is prior.

(5) The plaintiff having, by assignment, derived its title to both the Rietzel patent and the Harmatta patent from the Thomson Electric Welding Company (Rec., p. 1968), is, through its privity with that com-

pany, bound and estopped by the acts and representations of the latter.

(6) The defendant, as member of the general public, is entitled to urge the estoppel growing out of the acts and representations aforesaid made by plaintiff's predecessor in title to the Commissioner and upon which the Commissioner, as the representative of the general public, acted, as aforesaid, to the prejudice of the public and of the defendant as a member thereof; and especially is this so as against any demand of the plaintiff asserted under the Harmatta patent, since defendant began and was established in the practice of spot welding of plane-faced metal plates in 1911 and 1912 before the Harmatta patent issued (Smith, Rec., p. 1004; Wibel, *Ibid.*, p. 1002; Prosser, *Ibid.*, p. 997; Findlater, *Ibid.*, p. 995; Evely, *Ibid.*, p. 992; Mills, *Ibid.*, p. 990; Wright, *Ibid.*, p. 987; Neeland, *Ibid.*, p. 985).

The Law of Equitable Estoppel

In Pomeroy's Equity Jurisprudence we find the following careful statement of the essential elements constituting estoppel (Vol. II, p. 1423, par. 805):

> "1. There must be conduct—acts, language, or silence—amounting to a representation or a concealment of material facts. 2. These facts must be known to the party estopped at the time of his said conduct, or *at least the circumstances must be such that knowledge of them is necessarily imputed to him.* 3. The truth concerning these facts must be unknown to the other party claiming the benefit of the estoppel, at the time when such conduct was done, *and at the time when it was acted upon by him.* 4. The conduct must be done with the intention, or at least with the *expectation* that it will be acted upon by the other

party or under such circumstances that it is both natural and probable that it will be so acted upon. There are several familiar species in which it is simply *impossible* to ascribe any *intention* or even *expectation* to the party estopped that his conduct will be acted upon by the one who afterwards claims the benefit of the estoppel. 5. The conduct must be relied upon by the other party, and, thus relying, he must be led to act upon it. 6. He must in fact act upon it in such a manner as to change his position for the worse; in other words, he must so act that he would suffer a loss if he were compelled to surrender or forego or alter what he has done by reason of the first party being permitted to repudiate his conduct and to assert rights inconsistent with it. It will be seen that *fraud* is not given as an essential requisite in the foregoing statement. It is not absolutely necessary that the conduct mentioned in the first subdivision should be done with a fraudulent purpose or intent, or with an actual and fraudulent intention of deceiving the other party; nor is this meaning implied by any of the language which I have used. The adoption of such an element as always essential would at once strike out some of the most familiar and best established instances of equitable estoppel. Undoubtedly, a fraudulent design to mislead is often present as an ingredient of the conduct working an estoppel, but this only renders the result more clearly just, and, if I may use the expression, more conclusive."

Again (*Ibid.*, p. 1445):

"With respect to the persons who are bound by or who may claim the benefit of the estoppel, it operates between the immediate parties and their privies whether by blood, by estate, or by contract."

Herman on Estoppel, Vol. I, p. 5, says:

"Sec. 7. The following are recognized propositions with respect to an estoppel *in pais:*

1. If a man, by his words or conduct, willfully endeavors to cause another to believe in a certain state of things which the first knows to be false and if the second believes in such a state of things and acts upon his belief, he who knowingly made the false statement is estopped from averring afterwards that such a state of things did not in fact exist.

2. If a man either in express terms or by conduct, makes a representation to another of the existence of a certain state of facts which he intends to be acted upon in a certain way and it is acted upon in that way, in the belief of the existence of such a state of facts, to the damage of him who so believes and acts, the first is estopped from denying the existence of such state of facts.

3. If a man, whatever his real meaning may be, so conducts himself that a reasonable man would take his conduct to mean a certain representation of facts and that it was a true representation and that the latter was intended to act upon it in a particular way, and he with such belief does act that way to his damage, the first is estopped from denying that the facts were as represented.

4. If, in the transaction itself which is in dispute one has led another into the belief of a certain state of facts, by conduct of culpable negligence calculated to have that result, and such culpable negligence has been the proximate cause of leading, and has led, the other to act by mistake upon such belief to his prejudice, the second cannot be heard afterwards as against the first, to show that the state of facts referred to did not exist.

5. Nobody ought to be estopped from averring the truth or asserting a just demand, unless by his acts or words, or neglect, his now averring the truth or asserting the demand would work some

wrong to some other person who has been induced to do something, or to abstain from doing something by reason of what he has said or done, or omitted to say or do."

Everest & Strode on Estoppel, 2nd Edition, pp. 14, 15, furnishes another contribution to the subject, as follows:

"Estoppels *in pais*, or equitable estoppels, as they have sometimes been called, are also of an importance which is growing daily, and far from being odious, are certainly equitable in their nature, and ought to be regarded with favor in courts of equity. Thus, in the case of The Citizens Bank of Louisiana vs. First National Bank of Orleans, L. R. 6 H. L., 352, Lord Selborne says:

'I apprehend that nothing can be more certain than this, that the doctrine of equitable estoppel by representation is a wholly different thing from contract, or promise, or equitable assignment, or anything of that sort. The foundation of that doctrine, which is a very important one, and certainly not one likely to be departed from, is this: That if a man dealing with another for value makes statements to him as to existing facts, which being stated would affect the contract, and without reliance upon which or without the statement of which, the party would not enter into the contract, and which, being otherwise than as they were stated, would leave the situation after the contract different from what it would have been if the representations had not been made, then the person making those representations shall, so far as the powers of a court of equity extend, be treated as if the representations were true, and shall be compelled to make them good.'

To the same effect are the remarks of Lord Blackburn in his judgment in the case of Burkenshaw vs. Nicolls, L. R., 3 App. Cir., 1004, where the learned judge says:

'Now sometimes there is a degree of odium thrown upon the doctrine of estoppel, because the same word is used occasionally in a very technical sense, and the doctrine of estoppel *in pais* has been thought to deserve the odium of the more technical class of homologation. But the moment the doctrine is looked at in its true light, it will be found to be a most equitable one, and one without which, in fact, the law of the country could not be satisfactorily administered. When a person makes to another the representation, "I take upon myself to say such and such things do exist, and you may act upon the basis that they do exist," and the other man does really act upon that basis, it seems to me it is of the very essence of justice that, between those two parties, their rights should be regulated, not by the real state of the facts, but by that conventional state of facts which the two parties agree to make the basis of their action; and that is what I apprehend is meant by estoppel *in pais* or homologation. But whether the term be used in its more or less technical sense, I take it that one common idea runs through the whole, namely, that your rights as between yourselves, must be regulated upon the basis, that that is accurate which you induced the other side to take as the basis upon which he was to act."

The above rather full quotations from the text writers are given because they represent the impartial conclusions reached by learned authors after careful and disinterested examination of the subject.

The text, in each instance, is supported by many cases o which we deem it unnecessary to here particularly refer.

The Commissioner of Patents is Regarded in the Patent Office and By the Courts as the Representative of the Public.

In the administration of the patent law it has always been held that the public, against whom the monopoly is effective, are represented, in the contract between the inventor and the Patent Office, by the Commissioner, whose duty it is to determine the right to the grant. For instance, in *Ex parte* Kephart (C. D., 1903, p. 137), it was held in regard to a public-use proceeding, that:

> "The protestant in public use proceedings has no authority to make a binding agreement as to what shall be considered evidence in the case. Such proceedings are not to be regarded as a contest between the protestant and the applicant, but as an investigation on *behalf of the public* by the Patent Office. U. S. *ex rel* National Phonograph Co. vs. Allen, C. D. 1902, p. 571. The parties in interest are *the applicant* on the one hand and *the public* on the other.
>
> The protestant does not represent the public and cannot make agreements for it. This office alone represents the public and its approval is necessary to make any agreement affecting the merits of the case binding."

Judge Baker, in Railroad Supply Co. vs. Hart Steel Co., 222 Fed., 274, defined a patent in the following language:

> "A patent is a contract between the Government *on behalf of the people* and the patentee. The grant of a patent might have been made conclusive evidence of its validity, except against suits by the Government for fraud or mutual mistake in the issuance.

> But the fact that certain defenses are left open to the individual should not make us lose sight of the nature of the presumption that attaches to the grant. Not merely has the application been examined *on behalf of all the people* by experts who have access to all the prior patents and publications of the world," etc., etc.

See also Fried. Krupp Aktien-Gesellschaft v. Midvale Steel Co., 191 Fed., 588-594, Buffington, J., and Grant v. Raymond, 6 Peters, 217-241, Marshall Ch. J.

That the Commissioner constantly acts for and on behalf of "all the people" in his dealings with applicants, and that the estoppel upon an applicant arising from the disclaimers, qualifications and limitations that he imposes upon himself when he accepts a patent may be availed of by any member of the general public who is attacked under the patent, is well established.

In New York Belting & Packing Co. vs. Sibley, 15 Fed., p. 386, the patentee was confronted in the Patent Office with an English patent as a reference and, in order to overcome its disclosure, he amended his claim by adding certain limitations. Later, when his patent was put in suit, he was held by the Court to a construction of it that accorded with his statements and conduct when prosecuting his application, the Court saying:

> "It has several times been decided by the Supreme Court that disclaimers, qualifications, and limitations imposed upon a patentee by the Patent Office, are forever binding upon him, if he chooses to accept a patent containing them. Not only are third persons likely to be misled to their injury by any subsequent enlargement by reissue or by a

broad construction of the claims thus intended to be limited, but these qualifications are conditions precedent, without which there would have been no grant at all, and, of course, the grant must be taken as it is given. * * * Construing the patent as we must according to the requirements of the Office acquiesced in by the patentee, the defendant does not infringe it, because his frame has not the peculiar construction which the Examiner declared was the only ground for issuing the patent."

The binding character of representations made by a patentee to the patent-granting authority acting for and in behalf of the public, and the availability of the estoppel created by such representations to any member of the public who is afterward pursued by the owner of the patent, is strikingly illustrated by the case of Union Manufacturing Co. vs. Lounsbury, *et al.*, 2 Fish. Pat. Cas., 389; 24 Fed. Cas., 587, decided by Judge Nathaniel Shipman, a great patent judge, in September, 1862.

The material facts of that case were as follows:

On July 15, 1829, a patent was granted to one John Arnold for an "Improvement in the Machines for Forming the Web of Cloth of Wool, Hair, or Other Suitable Substance, Without Spinning or Weaving." This patent expired by limitation (patents then running for only fourteen years) on July 15, 1843.

On October 20, 1836, another patent was granted to the same John Arnold and one George G. Bishop, for a joint invention of the two last named, relating to improvements in the same class of invention. This patent also expired by limitation on October 20, 1850.

In January, 1849, after the original Arnold patent had expired but just before the expiration of the Arnold and Bishop patent, Congress was petitioned by

the owners of both patents for the extension of both patents, as one. This petition was supported, from time to time, before a Committee of Congress, with perseverance, and finally, on March 29, 1856, an act was passed extending both patents, as one, for the further term of fourteen years from that date.

On March 18, 1856, the extended patent was reissued and suit was then brought upon it against the defendants, Lounsbury, *et al.* After a recital of the above facts the learned judge, in his opinion, said (p. 389):

> "The bill is founded upon the reissued patent and it becomes a vital inquiry whether or not this patent is valid. If it is not a valid patent, then the suit fails. If it is valid, and the respondents infringe, then they are liable to be enjoined. I have no doubt on this question. The patent of 1839, both in its original form and in that of the reissue, is invalid, because it did not and does not describe a practical invention. The conception of the inventor, in all the forms in which he attempted to reduce them to practice, proved useless and abortive, until 1836, when the joint invention of Arnold and Bishop was made. The proof of the utter worthlessness of the invention originally made by Arnold, is to be found in the evidence produced before the Court from the files of Congress, and upon which that body acted in granting the renewal. This evidence was presented and presented to that body by these complainants, and it presents conclusive proof, to my mind, that the original "invention was incomplete." And, after having obtained an act of Congress extending the two patents as "one invention," on the express grounds that the first one was no complete invention, within the meaning of the patent act, it is too late for these complainants to set up the contrary fact, and seek by injunction, to protect that which they have solemnly declared

to be worthless. The report of the committee, recommending the passage of the act says: 'No inconvenience can result to the public or injury to any individual, by the renewal and extension of the first patent, because the invention was imperfect, and a working machine could not be constructed except in connection with what is covered by the second patent.' This conclusion of the committee is supported by evidence presented to them and which has been adduced on this trial. After the legislature has acted upon this conclusion and passed the statute in question for the benefit of these complainants by granting them rights adverse to the public and to individuals, it would ill comport with the duty of a court of equity to aid them in reversing the facts, and thus working the very hardship which they had satisfied Congress could never exist.

Should it be said that this conclusion of the court only applies to the machine, and leaves the original process sheltered by the reissue, there are several answers. If this process is anything more than the function of the machine, it is a purely mechanical process wrought by the machine, and by the machine alone.

If no working machine could be made according to the invention of Arnold, then no process was ever successfully invented by him, for there is no evidence that he worked the process except by the machine. The intellectual conception of a possible process without a potential working of it out, is not patentable.

If an inventor merely conceives a mechanical process in his mind, and then sets to work to construct a machine to work that process and works it out in no other way, and the machine fails to work successfully, then his claim as the inventor of a process is as groundless as his claim as the inventor of a machine.

Arnold having failed to work this alleged process, except by his machine, both claims to 'inven-

tion,' in the sense of the patent act, fall to the ground.

But if it appeared that Arnold invented a mechanical process that could be distinguished from the function of his machine, and which could furnish a distinct ground of claim for an invention, still there is, in the judgment of the court, an insuperable difficulty in the way of these complainants availing themselves of it.

They represented to Congress, in the most solemn manner, that the invention of 1829 was incomplete and worthless of itself and of no value except in connection with the subsequent invention of 1836. They must, therefore, be deemed to have repudiated any claim to an invention by Arnold of a mechanical process, and to have abandoned it, if any such claim had ever existed in Arnold or themselves. Congress having passed the act for their relief, based upon the faith of these representations, equity and good conscience demand that they should be held to them."

This last mentioned case cannot be distinguished, in principle, from the one at bar.

There, the patent granting authority, acting for and on behalf of the public, was Congress itself; here, it was the Commissioner of Patents.

There, the representations to Congress of which the estoppel was predicated was the worthlessness and inoperativeness of the process of the patent of 1829; here, the representations to the Commissioner, were, first, the successful reduction to practice of the process by Rietzel establishing Rietzel's priority over the British and French Harmatta disclosures, by virtue of which the Rietzel patent was secured; and, secondly, the successful reduction to practice of the process by Rietzel, establishing Rietzel's priority over the disclosure of the U. S. Harmatta application by virtue of

which a judgment on the record against Rietzel and his assignee was averted; a standing on the question of priority was secured to Rietzel and his assignee; and the availability of the Rietzel patent against the public continued.

There, as here, the estoppel was urged by a member of the general public sued as an infringer, against one in privity with those who had made to the public agent the representations and declarations of which the estoppel was predicted.

The case constitutes an emphatic vindication of the principle now invoked by defendant in this Court of Equity, that a patentee or one in privity with him, will not be permitted to declare and represent one state of facts to the public or its representative, upon which the public or its representative acts to the detriment of the public, and to then subsequently repudiate these declarations and representations and assert a different and contradictory state of facts, as against a member of that same public.

No one can doubt that when the representations in question were made it was the intention and expectation that the Commissioner would gain the impression and form the judgment that Rietzel was the prior inventor over Harmatta, as well with respect to the process of welding plane-faced plates, face to face, as with respect to the process of welding plates provided with projections and that Rietzel's practice of the former process carried back to the year 1898. The estoppel cannot, therefore, be limited to the last named process. Had the representations been intended to extend only to such process there would have been no point in having mentioned the process of welding plane-faced plates by means of a pointed electrode

with such particularity and as the one first to be practiced by Rietzel.

That the Commissioner so understood the matter is clear from his grant of claims to Rietzel covering fully Harmatta's disclosure. The Trial Court sustained this defense and its treatment of the matter in its written opinion leaves nothing to be desired (pp. 42-50).

RIETZEL DID ACTUALLY ELECTRICALLY WELD PLANE-FACED PLATES IN SPOTS IN 1898.

Although the truth in regard to Mr. Rietzel's early work is immaterial to the defense of equitable estoppel just discussed, defendant, nevertheless, had the temerity to go into plaintiff's camp, summon Mr. Rietzel and put him on the stand in support of its other affirmative defense of prior invention by Rietzel (Rec., p 633).

Mr. Rietzel is still in the employ of the Thomson Company, as both he (Rec., p. 660; Rd-Q. 167) and the witness Clark (Rec., p. 262) had to admit. All that he had to say was evidently tinctured with the bias of interest. There were, however, some very material things he was obliged to admit, namely, that he was employed by the Thomson Electric Welding Company from August, 1888, to June 21, 1907 (Rec., p. 634, Q. 5) as foreman, superintendent, engineer and manager; that in July, 1898, he welded together plane-faced overlapped plates of metal, in spots, by the use of a flat electrode on one side of the plates and a pointed electrode on the other side (*Ibid.*, p. 635); that these electrodes were used in connection with a standard Thomson butt welding machine (*Ibid.*, p. 636);

that the welds made were subjected to various severe tests and found to be good welds (*Ibid.*, p. 638); that the meeting faces of the overlapped portions of the metal were plane, smooth faces; that his work involved a method of welding two plates or sheets of metal together, face to face, between electrodes, consisting in restricting the area of contact of an electrode with said plates to a spot, passing a heating electric current from said electrode to the co-operating electrode through said spot to heat the work to the welding temperature and applying pressure to the work in line with said spot to effect the welding of one plate to another; that the product or article produced by him consisted of metal plates fastened together by a number of distinct and isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and spots on the meeting surfaces being separated from one another by distinct unwelded areas (*Ibid.*, p. 635); that his contacts or electrodes were of copper (*Ibid.*, p. 637).

Under the questioning of counsel for plaintiff, Rietzel, of course, attempted to give the impression that his work in 1898 was fugitive, experimental and amounted to nothing. Having several times referred to his work as experimental, he was asked the following question on redirect examination (*Ibid.*, p. 659):

> "Rd-Q. 164. How do you reconcile your answers to X-Qs. 160 and 161 with the statements in your affidavit filed in your application for patent and executed on the 15th day of February, 1909, in which you say, 'That prior to the 18th day of February, 1904, he repeatedly, successfully practiced the methods of fastening two sheets of metal together face to face by welding them at spots

in their meeting surfaces by confining the heating electric current passed from one plate to the other in such spots and localizing the welding pressure at such spots * * * that work was repeatedly and successfully done in this manner upon various sizes and pieces of metal plates * * *.

That the work done by him as aforesaid, demonstrated the complete success of the operation and that metal plates could be successfully and firmly united together by distinct or isolated electric welds forming welded spots of union in their meeting faces and constituting in effect a successful substitute for a union of the same by a number of rivets.'

A. I can answer that by saying that I did weld various pieces of sheet metal together by using the pointed electrode as one and a flat electrode as the other, but only so far as I can remember now at the times mentioned, that is in July, 1898, and again in September or October, 1898, I considered some of the welds that I made satisfactory and successful, but did not consider it a commercial or practical experiment at that time."

The Court will, of course, have to decide which piece of evidence has the greater probative force, the testimony of Mr. Rietzel given, as a hostile witness, in a strenuous litigation, in 1919, or the affidavit of Mr. Rietzel given *ante litem motam*, in February, 1909, ten years earlier.

Of the two persons to whom Mr. Rietzel admits having explained his invention, one, Mr. Charles Osgood, is dead (Rec., p. 254, Q. 26) and the other, Mr. Clark, is still an employee of the Thomson Company and remembers nothing!

Mr. Rietzel, when on the stand, made a sketch illustrative of the work done by him in 1898 (Rec., p. 640). It is identified as "Defendant's Exhibit Rietzel

Sketch" and is reproduced in the record, p. 2041. Counsel for plaintiff endeavored to establish by the witness that welds applied in accordance with the showing of this sketch would, because the pointed electrode was placed initially close to the edge of the work, "squash out" the metal at the edge. Here, again, the evidence of the affidavit of 1909, drawn by counsel for the Thomson Company ten years earlier, must be considered. It says (Rec., p. 646):

> "That the work done by him, as aforesaid, demonstrated the complete success of the operation and that metal plates could be successfully and firmly united together by distinct or isolated electric welds forming welded spots of union in their meeting faces and constituting in effect a successful substitute for a union of the same by a number of rivets."

This affidavit was filed to support such claims of Rietzel as the following, for instance (Rec., p. 1770):

> "6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces, which is restricted in area throughout the operation so as to leave on the meeting surfaces a well defined and comparatively extensive area of no union completely surrounding said spot."

And this (Rec., p. 1799):

> "24. Sheet metal plates electrically welded together by heating current and pressure at a spot or spots definitely located in and involving the heated material of the opposed or meeting portions of the plates entirely surrounded by distinct areas unwelded, as and for the purpose described."

Furthermore, Mr. McBerty, while on the stand, before his Honor Judge Killits, produced samples of welding showing that welding may be done with the pointed electrode close to the edge of the work, without producing any "squashing out" of the metal (Rec., p. 764, Q. 296). (Defendant's Exhibit Y.)

Mr. Rietzel gave a reason why the spot welding of plane-faced plates was not mentioned in his application filed in February, 1905, as follows (Rec., p. 641):

> "Q. 57. I notice that this application was filed in February, 1905, and illustrates in its drawings more particularly the formation of spot welds by the use of projections between the proximate faces of the sheets. Do you know of any reason why you did not mention in the application for this patent the spot welding of sheets without projections between the proximate faces?
>
> A. Well, I might explain that by saying that at that time, that is, the period between 1896 and 1904 it was not the policy of the Thomson Electric Welding Company to apply for patents of any kind until such time as they had, or would expect in the immediate future, to receive an order for an electric welding plant for any particular or special purpose before applying for patents and as during the period between the fall of 1897 and the year 1904 we did not receive or have any problems put up to us by which use might be put to some of those experiments which I did in 1898 as regards the welding in spots, but in 1904 we had occasion to apply on a particular class of work the method of raising projections on the work to be operated on. As this proved highly successful at the very start it was decided to make application for patents on this subject-matter."

If the whole truth were told about this matter it would doubtless appear that the reason that the weld-

ing of plates having projections was disclosed and the welding of plane-faced plates was not disclosed was the belief, at that time, that there was no patentable invention in the welding together of plane-faced plates and, therefore, no point in mentioning that such a thing had been or could be done.

Not only did the Rietzel application, as originally filed, make no disclosure of the welding together of such plane-faced plates, face to face, but it contained no claim broad enough to include and cover such a process (Rec., p. 1727).

Examination will show that original claims 1, 2 and 3 were each limited to a process that involved the *simultaneous* making of a *multiplicity* of distinct welds at a *multiplicity* of contact points, and that claims 4, 5, 6, 7 and 8, constituting the remainder of the original claims, were each limited to a method of welding involving the formation of distinct projections on the plates, by indenting, or otherwise.

It was not till the citation by the Patent Office of the British patent of Harmatta, on the 8th day of June, 1908, *nearly three years after the application of Rietzel was filed,* that Rietzel began to file claims that were inclusive of Harmatta's disclosure of the welding of plane-faced plates, face to face, and that covered Rietzel's similar early work. The following is typical of the first effort to put forward such an inclusive claim, to-wit, on Nov. 30, 1908 (Rec., p. 1770):

> "6. The method of uniting sheets of metal by pressing them together and at the same time passing a heating and welding current from one to the other at a spot on their meeting surfaces which is restricted in area throughout the operation so as to leave on the meeting surfaces a well defined and comparatively extensive area of no union completely surrounding said spot."

It was to support these broad inclusive claims that Rietzel's early work of 1898 in the spot welding of plane-faced plates, face to face, was harked back to to accomplish the "short circuiting" of Harmatta, whose date of invention was known then, to be at least as early as 1904, the effective date of his British patent, and was presumed to be earlier still, if by any chance, he had pending a United States application—which, it subsequently turned out, he had!

Before leaving this affirmative defense of prior invention by Rietzel, we would remark, that if the affidavits of Rietzel put forward by the Thomson Company did not really tell the truth, but were false and misleading, and intended so to be, then there is, indeed, greater reason for sustaining the defense of equitable estoppel. If a statement of facts believed and offered *in good faith*, may, nevertheless, operate as an estoppel, by how much greater reason should a statement of facts *known to be false*, have that effect.

WHAT HARMATTA THOUGHT HE HAD INVENTED AND WHAT HE SOUGHT TO PATENT

No doubt Mr. Harmatta would be very much surprised to learn what plaintiff now contends was the invention for which he originally solicited a patent.

By a process of elimination and suppression, on the one hand, and of expansion, on the other, the things claimed by him as of his invention in his original application have been entirely displaced by claims for processes and products which he not only never claimed to have invented, and never swore to, but never claimed nor suggested as inventions at all!

In the record will be found a certified copy of the application as originally filed by him and of all amend-

ments made to it (Rec., p. 1354), and also a detached, line for line, copy of the original application (Rec., p. 1156) and a copy of the original drawing (*Ibid.*, p. 1166) printed separately.

Apparently, the only prior electric welding art known to Harmatta at the date of his original specification was (1) the process of electric arc-welding exhibited, for instance, in the United States Benardos and Olzewski patent No. 363,320 (Rec., p. 1030) of 1887, wherein no pressure at all was exerted on the work by the current-carrying electrodes, and (2) the process of electric resistance-welding disclosed in the original Thomson "Art" patent No. 347,140 of 1886 (Rec., p. 1021), wherein pressure was applied directly to the whole surface of the pieces or parts to be united through the medium of electrode clamping jaws, for the original Harmatta specification states (p. 2, Rec., p. 1357):

> "According to none of the present known electric welding processes are the articles to be welded firmly pressed together during the welding operation by one or both electrodes, for the purpose of favoring welding. Hitherto either no pressure has been exerted at all, or it has been exercised at a certain distance from the place of welding, or at all events not centrally direct upon the electrodes pressing on the place to be heated. In short, hitherto direct electric welding pressure has never been exercised by means of the electrodes located in the direction of the current directly above the surface or point being welded."

The specification then goes on to point out that various means may be employed for exerting the necessary pressure required by the alleged new process (p. 2):

> "For carrying out the new process various apparatus may be employed, as the necessary pressure may be exerted at the place of welding by the aid of any of those technical means which are suitable for producing or transmitting pressure; *e. g.*, with a press either direct or by means of indirect transmission by levers. Or it may be by means of simple hand levers, that is to say, by means of direct or indirect manual power."

And then comes a description of the various forms of electrodes that may be employed for applying the pressure. Figs. 1 and 5 are referred to as illustrating the use of one form of electrode that will serve; and Figs. 2 and 3 another form of electrode; Fig. 4, another form; and Fig. 6, still other forms.

Referring to the forms of electrodes shown in Figs. 1 and 5, the specification states (p. 2):

> "Fig. 1 is a view illustrating the welding of two metal sheets of equal thickness, intermittently or at certain spots only.
>
> * * * * *
>
> Fig. 5 is a side elevation of a welding device (also illustrated in part in Fig. 1) according to which the pressure is exercised by pin-shaped electrodes, the form of which may be suited to the particular purpose in view, and which may be adapted to work on the smallest possible surface of contact."

And referring to the form of electrode shown in Figs. 2 and 3, the specification says:

> "Fig. 2 is a front elevation and
> Fig. 3 a side elevation of a device which may be employed for continuous welding, the pressure being exerted by roller electrodes, whereby the advancing series of single points of the seam to

be welded is united to a whole with a minimum consumption of current."

It is perfectly apparent that Blumuttz regarded both these forms of electrodes as operating upon precisely the same principle, as indeed they do. The pin form of Figs. 1 and 5, of course, applied pressure to the work at but a single point at a time with a minimum consumption of current, and to make plain that the roller electrodes operated similarly, the specification industriously stated, as we have already seen, that where the pressure is applied through such roller electrodes,

"the *advancing series of single points* of the seam to be welded is united to a whole with a minimum consumption of current."

There was, apparently, a studied attempt on Blumuttz's part to show, as closely as possible, that the welding of the plates at a series of points so close together as to cause a merging of the welding was not essentially different from the welding of the plates at separated, isolated points.

In either case, there was, as expressed in the quoted part of the specification, "a minimum consumption of current."

To have welded the whole length of the seam at once, by flat electrodes that extended from end to end, would have obviously required a very larger amount of current, but by using rollers that operated upon the plates at one point only at a time, practically the same economy of current was effected as when pointed electrodes applying current at but one point at a time, were employed.

Nor was any distinction, in principle, in the construction of the different forms of electrodes, made in the original claims.

The first two claims were relatively broad and inclusive. They read as follows (Rec., p. 130):

> "1. The process of electric welding, consisting in employing the electrodes not only to conduct the current to the objects being welded, but also to exert a repulsive pressure on the same, substantially as described.
>
> 2. An electrode apparatus for electric welding, comprising two electrodes between which the objects to be welded are introduced, and means whereby one of the electrodes can be approached to and receded from the other, substantially as described."

Both of these claims apply equally to the gun electrodes of Figs. 1 and 3 and to the roller electrodes of Figs. 2 and 4, and were evidently intended to do so.

The two remaining claims were specific to the roller electrode apparatus *per se*, and read as follows:

> "3. An electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, and means for pressing the electrodes to the work, substantially as described.
>
> "4. An electrode apparatus for electric welding, comprising two roller electrodes between which the objects to be welded are introduced, means for pressing the electrodes to the work, and means for rotating one or both of the rollers for the purpose of advancing the work in its path between the electrodes, substantially as described."

On January 5, 1903, all these claims were rejected. On May 18, 1903, attorneys for Hornaday replied

to this rejection by striking out the original specification and claims and filing a new amended specification and a single claim (*Ibid.*, p. 1367) and by striking out the original drawing and substituting a new drawing (*Ibid.*, p. 1373).

This amendment eliminated all showing of the roller electrode apparatus from the application and it was never thereafter reintroduced, which accounts for its absence in the Harmatta patent, as finally issued.

The new claim introduced in connection with the substitute specification last referred to read as follows (*Ibid.*, p. 1373):

> "The process of electrically welding thin sheets and the like, consisting in applying pressure at the place of welding of the two superposed metallic objects to be united, for the purpose of effecting thorough superficial contact between them, and then, whilst maintaining the said pressure, heating the objects by passing an electric current through them, substantially as described.'

On August 10, 1904, this claim was rejected on patent to Blevins, No. 758,503, of April, 1904. (*Ibid.*, p. 1374.)

On Nov. 26, 1904, the former claim proposed was stricken out and the following new claim filed, limiting the invention to the welding of sheets of two millimeters (about 2-25ths of an inch) or less in thickness (*Ibid.*, p. 1375.)

> "The process of electrically welding thin metallic sheets and the like, from about two millimeters in thickness downward, consisting in first pressing intimately together the two superposed metallic objects at the very point in which the

welding joint is to be formed, and then, whilst maintaining the intimate pressure, heating the objects by passing an electric current through them exactly at said point, in which the welding is to be effected, substantially as set forth."

This claim was, on March 30, 1905 (Rec., p. 1380) rejected on the so-called roller welding patent to Thomson, No. 444,928, of 1891 (*Ibid.*, p. 1047) and the so-called soldering patent to Thomson, 496,016 (*Ibid.*, p. 1053.)

On Nov. 17, 1905, another amendment was filed canceling the last quoted claim and substituting two new ones therefor, each also limited to the welding of plates of two millimeters or less in thickness (*Ibid.*, p. 1384).

These claims were, on Dec. 1, 1905, also rejected on the aforesaid Thomson patents, the Examiner stating (*Ibid.*, p. 1388):

"As described in patent 444,928, the plates to be welded are pressed together by means of the screw S, thus forming an electrical contact between them, the electric current is then turned on for the purpose of heating the plates and forming a weld between them—see the description in lines 84 to 94, page 1 of said patent."

On May 18, 1906, the claim last before presented was canceled and another substituted (by newly appointed attorneys, Messrs. O. E. Duffy & Son), reading as follows (*Ibid.*, p. 1395):

"1. The process of electrically welding thin metallic sheets and the like consisting in applying suitable electrodes on the metallic objects at the very point at which the welding joint is to be

formed, then causing said electrodes to exert a pressure on the metallic objects sufficiently to press the metallic objects intimately together at the point at which the welding joint is to be formed, then heating the metallic objects by passing an electric current through said electrodes and through the metallic objects, maintaining the pressure of said electrodes on the metallic objects during the passage of the electric current through the electrodes and metallic objects."

This claim also was, on June 7, 1906, rejected on the Thomson patents Nos. 496,019 and 444,928 of record (*Ibid.*, p. 1396).

On Dec. 3, 1906, the specification and claim were canceled and a new specification and claim filed (*Ibid.*, p. 1399).

The new claim read as follows (*Ibid.*, p. 1403):

"The process of electrically welding thin metallic sheets, consisting in applying suitable electrodes on the metallic sheets at the very point at which the welding joint is to be formed, then causing said electrodes to exert a pressure on the metallic sheets sufficiently to press the metallic sheets intimately together at the point at which the welding joint is to be formed, then heating the metallic sheets by passing an electric current through said electrodes and through the metallic sheets, and maintaining the pressure of said electrodes on the metallic sheets during the passage of the electric current through the electrodes and metallic sheets."

This claim was also rejected on the Thomson patents 496,019 and 444,928, of record, and also on the Blevins patent No. 758,503 (*Ibid.*, p. 1404).

On Dec. 4, 1907, or nearly a year after the last rejection, another amendment was filed striking out the

former claim and presenting two new ones, reading as follows (*Ibid.*, p. 1405):

> "1. The process of electrically welding a plurality of metal sheets, consisting in exerting a heavy mechanical pressure by means of electrodes on said sheets, thereby flattening, smoothing out and eliminating all irregularities and intimately pressing said sheets together, whereby air space and interstices between said sheets are eliminated subsequently passing an electric current through the sheets thus softening and welding same while maintaining the heavy pressure of the electrodes on the sheets.
>
> 2. The process of electrically welding thin metallic sheets, consisting in applying suitable electrodes on the metallic sheets at the very point at which the welding joint is to be formed, then causing said electrodes to exert a maximum pressure on the metallic sheets sufficiently to press the metallic sheets intimately together at the point at which the welding joint is to be formed, then heating the metallic sheets by passing an electric current through said electrodes and through the metallic sheets, and maintaining the maximum pressure of said electrodes on the metallic sheets during the passage of the electric current through the electrodes and metallic sheets."

These claims were, on January 6, 1908, also rejected on the Thomson patents of record (*Ibid.*, p. 1408).

On the 6th day of January, 1909, being the last day of the year allowed by statute within which to take action to avoid abandonment (4894 R. S., U. S.) a formal amendment to claim 1 last presented was made and a reconsideration of both claims requested (*Ibid.*, p. 1409). Both claims were, however, on February 9, 1909, rejected on the Thomson patents 444,928 and 496,016, and the Blevins patent 758,503 already cited in the case.

In his letter of February 9, 1909, last above referred to, the Examiner (who had already allowed the Rietzel application with claims covering Harmatta's disclosure apparently, began to think he was not giving Harmatta a square deal) stated (*Ibid.*, p. 1411):

> "It is thought that if there is any patentable matter in this case it resides in the securing of the sheet metal parts together by means of the small round, sharply-defined place of welding which answers the purpose of a rivet, as is set forth on page 6 of the original specification."

On January 28, 1910, nearly a year later, another substitute specification, claims and drawing were filed, the claims reading as follows (*Ibid.*, p. 1416):

> "1. The process of electrically welding thin metallic sheets, consisting in securing the sheet metal parts together by means of a small round, defined place of welding which answers the purpose of a rivet.
>
> "2. The process of electrically welding thin metallic sheets, which consists in introducing the sheet metal parts to be welded between electrodes having the form of pins, pressing said electrodes firmly together and closing the circuit, whereby the specified small round, very sharply defined place of welding which answers the purpose of a rivet is obtained, substantially as set forth."

Between the date of the Examiner's aforesaid suggestion of the possible existence of patentable subject-matter in Harmatta's case, to-wit, February 9, 1909, and the date of the response of Harmatta's attorney thereto, to wit, January 28, 1910, the application for the Rietzel patent was allowed, and the Rietzel patent, on the 20th day of July, 1909, actually issued, with its

broad claims covering the Harmatta disclosure, completely. Then, in acting upon the Harmatta amendment of January 28, 1910, the Examiner, rather naively stated, in a communication dated March 22, 1910 (*Ibid.*, p. 1418):

> "Claims 1, 5, 6, 16, 17, 18, 19 and 20 of the patent to Rietzel, 928,701, July 20, 1901 (219-10) are suggested to applicant in accordance with the provisions of Rule 96 for the purposes of interference. He is required to make these claims on or before May 3, 1910, otherwise he will be considered to have disclaimed the subject-matter thereof in accordance with Rule 96 and the claims now in the case will be rejected as covering nothing patentable over such disclaimer."

Patent Office Rule 96 referred to reads as follows:

> "96. Whenever the claims of two or more applications differ in phraseology, but cover substantially the same patentable subject-matter, the Examiner, when one of the applications is ready for allowance, will suggest to the parties such claims as are necessary to cover the common invention in substantially the same language. *The Examiner will send copies of the letter suggesting claims to the applicant and to the assignees, as well as to the attorney of record in each case.* The parties to whom the claims are suggested will be required to make such claims and put the applications in condition for allowance within a specified time in order that an interference may be declared. Upon the failure of any applicant to make the claim suggested within the time specified, such failure or refusal shall be taken without further action as a disclaimer of the invention covered by the claim, and the issue of the patent to the applicant whose application is in condition for allowance will not be delayed unless the time

> for making the claim and putting the application in condition for allowance be extended upon a proper showing. If a party make the claim without putting his application in condition for allowance, the declaration of the interference will not be delayed, but after judgment of priority the application of such party will be held for revision and restriction, subject to interference with other applications."

It would seem to have been fairer for the Examiner to have suggested these Rietzel claims to Harmatta before the Rietzel patent had been permitted to go to issue. It certainly was within his power to have done so under the provisions of this Rule 96. But, for reasons that will probably never be known, he did not do it; and when, on March 31, 1910, Harmatta's attorney presented an amendment incorporating, not only the suggested claims 1, 5, 6, 16, 17, 18, and 19, but five additional claims, as well, of the Rietzel patent (which number was ultimately increased by the addition of three claims more) (*Ibid.*, p. 1427), the Examiner did finally declare the interference it carried eight (8) counts (*Ibid.*, p. 1425), to which, by a second declaration, made later, were added three (3) counts more (*Ibid.*, p. 1430).*

The thing, however, that stands out prominently in the whole transaction is the fact that nothing patent-

*These claims were put in without a supplemental oath and have consequently never been sworn to by Harmatta. They were introduced more than five years after the imported foreign machines had been put into public use by The National Enamelling & Stamping Company and over two years after spot welding machines made by the Winfield Company and others had been put upon the market.

In the case of *ex parte* Lillie, 53 O. G., 2041, Commissioner of Patents Mitchell (than whom a sounder patent lawyer never lived) in criticising an attempt to enlarge a case by amendment after a long lapse of time, without the support of a supplemental oath, said:

ably new was discovered in Harmatta's case until it had been unsuccessfully prosecuted for between six and seven years and until after the Thomson Company's lawyers had, in the Rietzel case, convinced the Patent Office officials of the patentability of the disclosure of Rietzel and that Rietzel's invention antedated the effective dates of the Harmatta foreign patents.

After the decision of priority in favor of Harmatta, in the interference between the Rietzel patent and the Harmatta application—brought about, as we have seen, by the default of the Thomson Company and its failure to take testimony in behalf of Rietzel—the Harmatta application was again revised—not by O. E. Duffy & Sons, as would appear on the face of the record, but by H. C. Townsend, Esquire, the lawyer who wrote the original Thomson "Art" patent of 1886, and also the Rietzel patent, and who, notwithstanding, is afraid to state what "spot welding" is (Rec., p. 628)—and in it were incorporated many of the method or process claims and all of the article or product claims of the Rietzel patent; with the net result that when the Harmatta patent issued to the Thomson Co. on December 3, 1912, as a patent for seventeen years from that date, the Thomson Company had already, through its possession of the Rietzel patent (obtained by its representations of Rietzel's

"Another reason for the requirement of seasonable amendment is that courts look with disfavor upon attempts to enlarge the scope of an application once filed (Railway Co. vs. Sayles, 97 U. S., 554); and delay in filing amendments which enlarge the scope of the application as first filed, especially if they would operate to the prejudice of intermediate inventors, raises a presumption that the original application correctly set forth the scope of the invention then made, and that the additions or variations disclosed by the amendments are of late discovery. (Robinson on Patents, Sec. 561; see also Consolidated Electric Light Co. vs. McKeesport Light Co., 49 O. G. 1536 40 Fed., 21)."

priority over Harmatta) enjoyed the monopoly of the same subject-matter for over three years and a half, giving that Company an aggregate monopoly of twenty and one-half years, which, we respectfully submit, hardly squares with a Court of Equity's notion of fair play to the public.

THE HARMATTA PATENT

We have hereinbefore undertaken to analyze and discuss the disclosure of the Harmatta application as originally filed, drawing specific attention to the fact that all that Harmatta *therein* claimed and swore to as his invention, and, we may now add, all that he ever claimed and swore to *anywhere* as his invention, was, broadly (1) the process consisting in employing electrodes not only to conduct the current to the objects being welded, but also to exert a regulable pressure on the same, as carried out either by pointed electrodes, or roller electrodes, and (2) an apparatus for electric welding involving, specifically, the use of roller electrodes, both of which subjects-matter were clearly and indubitably anticipated, for instance, by the Thomson roller electrode patent No. 444,928, of January 20, 1891, upon which the application was repeatedly rejected.

We come now, to consider the patent itself, granted after the application had been kept pending for ten years, after the practical art had been fully developed by others, after the Rietzel patent had been granted, and after judgment against Rietzel, by default, had been secured by the deft manipulations of the Thomson Company.

Bearing in mind what the original application as filed showed and described, the first thing that strikes

us in examining the patent is the entire absence of any allusion to the use of roller electrodes. From both description and drawings the roller electrode apparatus, which figured so conspicuously in the original, has been entirely eliminated.

This was really done, of course, most foxily, for the purpose of avoiding comparison with the Thomson roller welding process; but is now attempted to be explained on the theory that while resistance-welding with one or more pointed electrodes is practicable, resistance-welding by means of one or more roller electrodes is entirely impracticable, thereby rendering the former patentable and the latter unpatentable!

The difficulty about this explanation is, however, that it is at war with the facts of record, that is to say:

(1) The Thomson patent No. 444,928 of January 20, 1891, taken and owned by the Thomson Electric Welding Co., shows and describes the use of such roller electrodes as practicable.

(2) The Lemp patent, No. 553,923, of February 4, 1896, also taken by the Thomson Electric Welding Company, shows and describes the use of such roller electrodes as practicable.

(3) The Harmatta British patent (Rec., p. 1124), the Harmatta (Egel) French patent (*Ibid.*, p. 1140), and the Harmatta Canadian application (Rec., p. 2043), all set forth the use of roller electrodes as practicable.

(4) Mr. Gravell, plaintiff's expert, admits that roller electrodes are practicable (Rec., p. 103, X-Q. 191, p. 104; X-Q. 199, *et seq.*).

(5) Mr. Geo. W. Knapp, plaintiff's witness, testifies that he successfully used roller electrodes (Rec. p. 221, X-Q. 27, *et seq.*).

(6) Mr. Geo. W. Knapp, Jr., plaintiff's witness, testifies to the same effect (Rec., p. 233, X-Q. 20, *et seq.*).

(7) Mr. Robert W. Clark, another of plaintiff's witnesses, testifies to the same effect (Rec., p. 263, X-Q. 114, *et seq.*).

(8) Prof. Thomson himself testifies to the practicability of welding by roller electrodes as carried out by his patent, 444,928, and states the same to be in extensive use (Rec., p. 533, Q. 28).

(9) And Mr. Dyer, defendant's expert, testifies to the entire practicability of roller electrodes and to the repeated successful use of the same by him (Rec., p. 583, p. 597, *et seq.*).

The next thing that attracts our attention is the new matter which the specification of the patent discloses.

On page 1, line 12 of the specification, we find a statement to the effect that the invention consists "also in the new article provided thereby." There is nothing in the original indicating that Harmatta ever supposed he had invented a new article. He neither described nor claimed such.

The matter on page 1, lines 34 to 97, inclusive, is, in its entirety, new matter. It is what Mr. Townsend, the draftsman of the amended specification, put in in October, 1912, not what Harmatta approved of and swore to in 1903.

This is the new stuff (p. 1, lines 34 to 97, Rec., p. 388):

> "It has been before proposed to electrically weld two rods of metal together by a butt welding process, the area of union effected being substantially co-extensive with the cross section of the pieces at their meeting ends, that is to say, the weld has been made over substantially the whole area of the opposed portions of said pieces. It

has also been proposed to make a lap joint between the ends of two strips of metal by electrically uniting them together over substantially the whole area of the lapping surfaces.

A weld formed according to my invention is distinguished, however, from such prior welds, among other things, by the fact that the opposed surfaces available for uniting the pieces together and in which it might be possible to form a weld are welded in a small spot or spots only, the spot or spots being surrounded by comparatively large areas of opposed surfaces in which no weld is made.

By the term 'electric welding' as used herein I mean that well-known process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined by the welding pressure, and I disclaim those processes of fastening pieces of metal together in which the parts are heated and practically melted down by an electric arc generated on the back of the piece by 'drawing' an arc by means of the electrode, as well as other processes in which the welding heat is generated externally and electrically in a resistance material and is imparted to the work by heat conduction from said resistance material in contact with the work.

While it is possible, consistently with my invention, to localize the desired pressure and heating current at the desired distinct small spot or area in various ways, this may be accomplished conveniently by pressure applied over the spot and itself localized on the back of the plate or sheet immediately over the small spot in which the union is to be made by using a tool pressed against the work by its end and formed at such end so as to engage the work by a spot or area of small extent and serving, likewise, by preference, as the electrode which feeds the current into the work

> to heat the same. The member which feeds the electricity being thus at the same time the tool, in this manner the most favorable conditions of working possible are secured, since as is well known, in really effective welding processes the place of welding brought to the proper temperature must be at once well hammered or pressed in order that the welding may be thorough."

The reference to the prior art is, of course, here but partial. It attempts to put out of the running welding by roller electrodes, though that was the principal thing disclosed and claimed by Harmatta originally, and, before him, by Thomson.

The statement as to "the spot or spots being surrounded by comparatively large areas of opposed surfaces in which no weld is made" was borrowed bodily from the Rietzel patent and finds no counterpart in the original Harmatta description.

The definition of electric welding "as used herein" as consisting of the "process in which the work is brought to the welding temperature by internal heat generated by the resistance of the work itself to the passage of an electric current at the place of contact between the parts to be joined," as distinguished from "other processes in which the heat is generated externally and electrically in a resistance material and is imparted to the work by heat conduction from said resistance material in contact with the work"—is wholly unwarranted by the original.

The original does not tell us of what material the electrodes are to be composed—does not say whether they are to be of high resistance or low resistance; does not say that they are of less resistance than the work; does not say that the heat is generated by resistance of the work itself or by the passage of the

current at the place of contact; and does not say that the heat is not generated externally in the electrodes and carried by heat conduction to the work. The disclosure of the original is quite consistent with the use of electrodes of relatively high resistance as suggested by the Benardos German patent, the Thomson patent 496,019, and the Stanley patent.

What Mr. Townsend, the draftsman of the Harmatta patent, wished the patent to show was that Harmatta appreciated and disclosed all of the essential principles and requirements of the most up-to-date application of resistance welding to the union of plates, and he, therefore, proceeded to make a description that would fill the bill, utterly regardless of the fact that in so doing he was setting forth that which Harmatta himself had never been guilty of disclosing or fathering, much less of swearing to.

Other examples of the interpolation of new substantive matter are found on page 2 of the specification. For instance, on lines 49 to 54 occurs the following:

> "And the circuit is closed by any suitable means thus producing a flow of heating current through the work itself *substantially localized therein* so as to bring the same to the necessary welding temperature at the desired spot only,"

for which there is no predicate in the original.

Again, lines 69 to 82, is wholly new matter, viz.:

> "The time or duration of pressure and heating and the amount of pressure as well as the volume of current for effecting the weld can be readily determined by experiment for different sizes or thicknesses of metal and as well understood in the art of electric welding to which my invention relates.

> "The operation is completed with the cutting off of the flow of current in the usual manner practiced in the art of electric welding and the withdrawal of pressure when desired to permit the work to be withdrawn from position between the electrodes."

And the description of the article produced is also wholly new, viz. (p. 2, lines 83 to 91, inclusive):

> "Sheet metal work made by this process is readily distinguished from that made by prior processes by the comparative absence of burning, roughening or disintegration of the material on the back of the plate when the operation is carefully conducted. It further possesses the advantage that there are no rivet heads to mar the finish of the back or outer surfaces of the plate."

As we have already pointed out, there was neither a specific description of, nor a claim for, the work or article in the original.

The Product or Article Claims of the Harmatta Patent Are Invalid Because for New Matter Never Sworn to By Harmatta to Be of His Invention.

The last five claims of the Harmatta patent, viz., claims 17, 18, 19, 20 and 21, are, in form, for products or articles of manufacture. They read as follows (Rec., p. 391):

> "17. Metal plates fastened together by a number of distinct or isolated welds on their meeting surfaces and in spots comprising meeting portions of the metal plates, the backs of said plates being practically unaltered in their metallic condition and the spots on the meeting surfaces being

separated from one another by distinct unwelded areas.

18. Sheet metal work comprising pieces of sheet metal welded together in the material of their meeting surfaces and in spots only, each surrounded by distinct areas of unwelded union, the back surfaces of said pieces being substantially unaltered over the welded spots, substantially as and for the purpose described.

19. Composite metal work having its component pieces welded together in spots only involving the material of their opposed or meeting surfaces, said spots being each entirely surrounded by distinct areas of unwelded union and the portion of the pieces back of the welds being substantially unaltered as and for the purpose described.

20. Metal work comprising a metal plate fastened on its surface to the opposed surface of another piece of metal by a weld at a spot only in the material of the opposed surfaces, said spot being surrounded by a distinct area of unwelded union and the back surface of said plate being practically unaltered over said spots, as and for the purpose described.

21. A metal article comprising two bodies of metal having adjacent plane surfaces united at a plurality of spaced and isolated spots of integral and autogenous welded union, the metal at the spots of welded union having substantially the same qualities as at other points."

These claims first appeared in the application for the Rietzel patent. Claim 17 was claim 16 in the Rietzel application and was introduced there by amendment of March 13, 1909 (Rec., p. 1798); claims 18, 19 and 20 were claims 17, 18 and 19, respectively, of the Rietzel application and were introduced there by the amendment of May 7, 1909 (*Ibid.*, p. 1807); and claim 21 was claim 20 of the Rietzel application and intro-

duced there by amendment of June 23, 1909 (*Ibid.*, p. 1814).

When the Harmatta application was sworn to and filed in 1903, it contained no claims at all to a product or article. As we have seen, of the four claims originally presented one was for a method or process and three for machine or apparatus.

It was not till March, 1910, over six years later, and after the Rietzel patent had issued, that the claims, copied word for word from the Rietzel patent, were inserted by amendment in the Harmatta application and the interference between Harmatta and Rietzel declared.

Comparison of the Harmatta patent with the Rietzel patent will disclose that claims 17, 18, 19, 20 and 21 of Harmatta and claims 16, 17, 18, 19 and 20 of Rietzel are identical.

Under Section 4886 of the Revised Statutes of the United States, patentable subjects-matter are divided into "art (process), machine, manufacture or composition of matter." These subjects are regarded as so distinct that a patent for a machine may not be reissued to cover a process (Eachus vs. Broomall, 115 O. G., 429), and a patent for a process may not be reissued to cover a product (Powder Co. vs. Powder Works, 98 U. S., 126), since in neither case will the reissue be for "the same invention."

Now, Harmatta applied for and claimed (1) a certain process (and not that claimed in his patent), and (2) a machine. He never swore to have invented anything else.

The introduction of claims for a product or article by his solicitors was unwarranted, just as was the introduction of a process claim in an apparatus application in American Lava Co. vs. Steward, 155 Fed., 731-

736, 738 (C. C. A-6); Steward vs. American Lava Co., 215 U. S., 161. This point was sustained by the trial court (Rec., pp. 41-42).

The Product or Article Claimed By Harmatta is Indistinguishable From That Claimed By Rietzel and Plaintiff is Estopped to Contend to the Contrary.

As we have seen, the product or article claims of the Harmatta patent were first put into the *Rietzel* patent by the Thomson Company's lawyer, Mr. Townsend, after knowledge of Harmatta's foreign patents had been brought home to him, and after the art of electrically welding plane-faced metal plates had been fully developed commercially by others than Harmatta. They were put into the *Harmatta* patent by the same skillful practitioner, with a view to again covering such product or article in the most complete manner possible, whether resulting from the welding of plane-faced plates or plates one or both of which were formed with slight projections.

It is significant that with all his ingenuity, Mr. Townsend was then, unable to describe the product or article made by the use of the Harmatta apparatus so as to distinguish it from the product or article made by the Rietzel apparatus. In other words, he regarded the two products as practically indistinguishable, as indeed they are.

By adopting the claims from Rietzel, who only *illustrated* the welding of plates provided with projections, and provoking an interference with Rietzel with respect thereto, and obtaining a judgment on that basis, plaintiff's predecessor and those claiming under him, including the plaintiff, are now estopped to assert that the said claims cover only a product or article re-

sulting from the welding of plane-faced plates, and not a product or article resulting from the welding of plates, one or more of which are provided with projections.

Here, again, the plaintiff is not permitted to blow hot and then cold. The same interpretation that was given the claims when they were obtained must be now given them when they are sought to be enforced against this defendant.

Inasmuch, therefore, as the present claims of Harmatta cover a product formed from plates having (one or more of them) pre-formed projections through which the welds are formed—which plaintiff is estopped to deny—it follows that such claims are all invalidated by the prior Robinson and Kleinschmidt patents which show products of this character.

THE PRIOR INVENTION OF SEBASTIAN ZIANI DE FERRANTI

The prior invention of Sebastian Ziani de Ferranti, of London, England, as disclosed in the Provisional application forming part of his British Patent, No. 11,921, of 1903, filed May 25, 1903 (Rec., p. 1479) affords still another answer to the Harmatta patent and justifies a separate discussion.

It should be explained that on May 14, 1904, while the Harmatta U. S. application was pending, but before the claims for process or product were amended into it, and before the application for the Rietzel patent was filed, de Ferranti filed in the United States Patent Office an application corresponding to his Provisional application previously, to-wit, on May 25, 1903, filed by him in Great Britain. This U. S. application was afterwards divided into several divisions,

one of which, namely, that filed on the 29th day of December, 1911, was, on the 2d day of October, 1913, put into interference with the Harmatta patent.

The subject-matter of that interference consisted of broad claims 1, 2, 3 and 4 of the Harmatta patent, which, as we have seen, were copied *verbatim,* by Harmatta from the Rietzel patent, No. 928,701, being claims 1, 2, 3 and 4 of the latter patent.

For the purpose of giving the Court a clear and comprehensive idea of the fullness of the disclosure of the de Ferranti British Provisional Application, and of its application to the issues of the interference, we cannot do better than quote from the testimony of Mr. Dyer, defendant's expert, given in the interference proceeding.

Mr. Dyer testified as follows (Rec., p. 1642):

> "The de Ferranti provisional specification refers to the difficulties experienced by the patentee 'in electrically welding together the two parts which differ considerably as regards their power of rising to the required welding temperature when heated at the point of junction' (page 1, lines 6-8). It is, therefore, clear that the specification relates to an electric welding process in which the welding heat is secured by the resistance of the two pieces to be joined as distinguished from processes in which an electric arc is used. In a broad and general sense this is the so-called Thomson process originally invented and patented by Prof. Elihu Thomson about the year 1886. In the de Ferranti provisional specification the inventor refers to the desirability of so carrying the process out as to secure substantially uniform welding conditions at the point of junction when the two parts which are welded together differ considerably in mass, or in other respects differ considerably as regards their power

of rising to the required welding temperature. The specification discloses a number of ways by which the welding process may be carried into effect, some of which, in my opinion, comply with the limitations of the claims in issue herein. I have prepared and present herewith drawings illustrating the several suggestions made by de Ferranti and disclosed by him in the provisional specification. Figure 1 illustrates the suggestion that 'grooves may be cut across the edge of the ring' (lines 20 and 21). With this suggestion, assuming the invention is carried out in connection with welding a series of turbine blades to a suitable carrier, the turbine blades will be welded to projections on the carrier by a butt-welding process and not by the particular method disclosed in the claims in issue. Figure 2 discloses the arrangement suggested by de Ferranti in the statement 'or several grooves may run circumferentially completely around the edge (page 1, lines 21 and 22). In this figure I also illustrate on an enlarged scale the under face of one of the turbine blades showing the area of the several welds by section lines. These welds in Figure 2 correspond to the spots or distinct or separate spots separated from one another by well defined areas of no union as defined in the claims in issue. In other words, with the arrangement shown in Figure 2, the welds occupy only a part of the surfaces to be secured together, thus localizing the current within circumscribed paths and effecting a more rapid and economical welding operation than when the entire area of the surfaces constitute the weld. In Figure 3, I illustrate the suggestion of de Ferranti described by the words 'or, again, intersecting sets of grooves inclined to one another may be cut on the edge of the ring' (page 1, lines 22-23). In this figure I also show on an enlarged scale the underside of one of the parts (in this case a turbine blade) illustrating by sectional lines the well defined spots or areas constituting the

plurality of welds and by means of which the welding current will be localized within restricted or circumscribed areas. This particular figure is that of the de Ferranti drawing in interference and manifestly it corresponds with the restrictions and limitations of the claims. In Figure 4, I illustrate the arrangement which is described by the words 'radial holes may be bored a short distance into the edge, either arranged in patterns, so as to leave intervening projections of untouched metal to which the blades may be welded' (page 1, lines 24-26). The weld in this case corresponds substantially to Figure 1, is coextensive with the entire area of the turbine blade and does not correspond with the limitations of the issue. In Figure 5, I illustrate the arrangement disclosed in the de Ferranti provisional specification by the words 'or arranged without particular reference to the position of the blades' (page 1, lines 26-27). In this figure I show on an enlarged scale the under face of the turbine blade illustrating the area of the welds which are arranged in spots or defined areas so as to localize the heating current and this arrangement also, like those of Figures 2 and 3, corresponds to the limitations of the issue. In Figure 6, I illustrate the suggestion made in the provisional specification and described by the words, 'Again, the result aimed at may be secured by boring holes through from face to face of the ring at a radius slightly less than that of its outside edge' (page 1, lines 32-33). With this suggestion the area of the weld will correspond to the entire engaging face of the turbine blade and therefore this particular suggestion does not correspond with the limitations of the issue. In Figure 7, I illustrate the suggestion described in the provisional specification by the words 'the ring may be built up of two or more thinner rings held in their relative positions by distance pieces or in any other convenient manner, the blades being then welded in position on

their outside edges' (page 1, lines 34-37). In this figure I also illustrate on an enlarged scale the bottom face of the turbine blade illustrating by sectional lines the area of the welds which are thus located in spots or well defined areas by which the heating current will be localized. Finally, in Figure 8, I illustrate the arrangement described by de Ferranti in the provisional specification by the words 'Again, the ring may be built up of a set of laminae, the edges of which are notched, the laminea being assembled in such a way that the notches are "stepped" with regard to each other, the intervening projection of metal thus following the shape of the turbine blades to be welded to them' (page 1, line 38; page 2, line 2). Assuming that with this arrangement the laminae are arranged closely together so that the projections referred to will constitute a substantially continuous surface to which the turbine blades are electrically welded, I find that with this suggestion the weld will occupy substantially the entire area of the bottom face of the turbine blade and will not correspond to the limitations of the issue. I do find, however, that the de Ferranti provisional specification, as illustrated in Figures 2, 3, 5 and 7, suggests a method of welding electrically two pieces of metal together wherein the welds will be confined to fixed, definite, limited areas or spots, by which the heating current will be localized, and in connection with these several suggestions made by de Ferranti of spot welding the two metallic parts, which may be obviously of any suitable character, I call particular attention to the following statement made in the provisional specification:

'The object to be kept in mind in this as in other modifications, is to remove sufficient metal to enable the temperature to rise to the welding point as explained above, while at the same time leaving sufficient areas untouched to insure due me-

chanical strength in the welded joint' (page 1, lines 33-36).

From these instructions of the inventor I understand that when a process is carried out, such as disclosed in Figures 2, 3, 5 and 7 above explained, the areas of non-union are made as extensive as possible so long as the isolated or spot welds provide 'due' mechanical strength. de Ferranti does not suggest that at all times the maximum mechanical strength in the weld is to be secured, because it is obvious that if conditions are equal a weld extending over the entire area of the bottom face of the turbine blade is mechanically stronger than a weld which occurs only in isolated spots or restricted areas. The provisional specification points out that so long as 'due' mechanical strength is secured, that alone is sufficient and with this in view the areas of non-union may be as extensive as possible.

Now referring to the suggestions contained in the provisional specification and illustrated in Figures 2, 3, 5 and 7, to which I have above referred, I find that there is here disclosed a method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots as defined in Claim 1 of the issue herein. Furthermore, I find that in these disclosures is suggested the method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well defined areas of no union consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected, as defined in claim 2, in issue herein. Furthermore, I find that in these figures, taken from the provisional specification, is disclosed a method of

uniting two pieces of metal consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot, or spots, of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot, or spots, as defined in Claim 3 in issue herein. And, finally, I find that in these particular disclosures of the de Ferranti original specification, a method is suggested of uniting two pieces of metal at a spot or spots only in their opposed heating surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other, while localizing the pressure in and confining the flow of current to the spot, or spots, of desired union so as to produce an isolated spot, or spots, of union, leaving distinct or well defined areas in which the pieces are not welded together, as defined in Claim 4 in issue herein."

The declaration of this interference with de Ferranti came as a surprise to the Thomson Electric Welding Company, the then owner of the Harmatta patent, and it meant that if de Ferranti could establish priority in respect to the issues of that interference the Harmatta patent was defeated.

The owner of the Harmatta patent was indeed badly caught. It had, as we have seen, prosecuted the application for the Rietzel patent (in blissful ignorance of the existence of the then pending United States Harmatta application), procured Rietzel to swear back of the Harmatta foreign applications by asserting inventorship in 1897-8, then drawn claims for Rietzel covering completely not only his disclosure but the Harmatta foreign disclosures as well, then taken the patent in Rietzel's name, then having

acquired Harmatta, caused Rietzel to default in the interference with Harmatta, in order that judgment might be rendered against him and in favor of Harmatta, and then issued the patent to Harmatta, only, finally, to run up against an interference with de Ferranti, who claimed the right, under the law, to hark back to his prior British application of May 25, 1903, as his date of constructive reduction to practice, and thus establish priority over Harmatta, the date of whose United States application was December 3, 1903, and the established date of whose foreign application was not earlier than October, 1903:

de Ferranti v. Lindmark, 30 App. D. C. 417;
Winter & Eichberg v. Latour, 35 App. D. C. 415;
Burt v. Coats & Cameron, 47 App. D. C. 185;
Jay v. Weinberg, 250 Fed. 469-472, Sec. 4887, R. S. U. S.;
International Convention, 25 Stat. at Large, 1383.

The worst of the situation was, that, having originally drawn the claims of the issue in a case (Rietzel's) which showed only the "spot welding" through projections on one or both of the parts to be welded, the owner of the Harmatta patent was now estopped to deny the application of the claims to the similar earlier work of de Ferranti. Finding itself thus caught, the owner of the Harmatta patent entered upon a campaign of disentanglement.

It proceeded at once to move to dissolve the interference on the ground, first, that de Ferranti had no right to make the claims in issue because his original application disclosed only a process of butt welding; secondly, because the claims in issue were based upon new matter not embraced in his original application

but inserted for the first time in the divisional case in interference; and, thirdly, because he did not make the claims in issue until more than three years after the publication of the same claims in the Rietzel patent, No. 928,701, on July 20, 1909 (Rec., p. 1502).

This motion was referred to the Law Examiner for disposition and he decided that de Ferranti did have the right to make the claims in issue (Rec., p. 1528, *et seq.*). A rehearing was applied for and denied (*Ibid.*, p. 1535).

Other motions to dissolve, not necessary here to detail, were made in behalf of Harmatta and overruled, and, finally, after testimony had been taken by both sides on the question of the identity of the disclosure of the de Ferranti United States application with that of the de Ferranti British Provisional, the case was submitted to the Examiner of Interferences, who decided, first, that the invention of the issues was not found in the de Ferranti British Provisional application, and, secondly, that de Ferranti was, under the decision of the Court of Appeals of the District of Columbia, in the case of Rowntree vs. Sloan, 45 App. D. C. 207, estopped to assert the claims in issue, because they had not been made by him within a year of the date of the publication of the Rietzel patent, No. 928,701, of July 20, 1909.

On appeal to the Board of Examiners-in-Chief, the Examiner of Interferences was reversed, on the first point, and sustained on the second,—the Board holding that the disclosure of the British Provisional application of de Ferranti was sufficient to enable him to go back to it as his date of effective reduction to practice, under the Statute, but holding further that the decision in Rowntree vs. Sloan was controlling of them and required that they decide that de Fer-

ranti, by reason of his delay of about seventeen months in making the claims, was barred of his right to make them.

In their decision, on the first point, the Board said (Rec., p. 2079):

> "de Ferranti's provisional application is particularly directed to a process of attaching turbine blades. And the object of the invention is stated to be the reduction of the large amount of metal theretofore appearing in the turbine ring to which the blades are welded, so as to reduce the flow of heat from the vicinity where the blade is welded to the ring. de Ferranti described in his provisional application several different forms or processes, some of which clearly do not come within the scope of the counts. The provisional specification did not comprise a drawing.
>
> We find that de Ferranti's witness has fairly set forth the inferences which those skilled in the art would draw from this provisional application. de Ferranti's Exhibit No. 1 correctly shows, in our opinion, what those skilled in the art would understand this provisional application to describe. In making the structures of figures 2, 3, 5 or 7 of this exhibit as described in the provisional application, those skilled in the art would infringe the claims which constitute the counts of this interference.
>
> Nor can this disclosure be regarded as accidental merely because the functions and advantages thereof which underlie the invention here in controversy were not appreciated by de Ferranti. They are inherent in his process as disclosed when carried out in the manner indicated in figures 2, 3, 5 and 7 of de Ferranti's Exhibit No. 1.
>
> Nor can this disclosure be regarded as accidental merely because de Ferranti also disclosed the forms or methods indicated in figures 1, 4 and 8 of this Exhibit No. 1 which do not involve the pro-

cess here in issue. When an inventor positively and definitely describes two or more structures or processes, he is not any the less a discloser and inventor of any one of these than he would have been had he disclosed only that one.

In this connection it is noted that Harmatta's application in interference shows a somewhat similar lack of appreciation of the present invention when originally filed. The emphasis and claims therein were to the application of pressure to the weld through the electrodes though the present process was unmistakably disclosed.

We hold that the Examiner of Interferences erred in not finding the invention in controversy to be adequately disclosed in the de Ferranti provisional application."

The de Ferranti Exhibit No. 1 referred to in the above quotation is found reproduced in the record (Rec., p. 1666, *et seq.*).

On the second point, the Board of Examiners-in-Chief said (Rec., p. 2080):

"Taking up the question of estoppel we find that de Ferranti appears to have first asserted claims to the present invention on *December 6, 1910.* As Harmatta's patent did not issue until 1912 de Ferranti is not barred by the same from prevailing here. But the counts of this interference were drawn from a patent to Rietzel, No. 928,701, which issued upon July 20, 1909. Harmatta made claims to the present invention at least as early as March 31, 1910, and an interference was declared between his application and the Rietzel patent upon April 26, 1910. If de Ferranti had been claiming the present invention at that time he would presumably have been placed in that interference. It is true that the Examiner could have taken steps toward the inclusion of de Ferranti's application in that interference at any

time after December 6, 1910, when de Ferranti first laid claim to the present subject-matter. This was presumably overlooked by the Examiner. If the claims that de Ferranti advanced on December 6, 1910, had been advanced before July 20, 1910, he would not have been estopped even though the Examiner did not take steps looking to the addition of de Ferranti to the Rietzel-Harmatta interference. As it is, however, de Ferranti did not make any claim until more *than a year after* the issue of the Rietzel patent, whereas Harmatta did do so and has prevailed over Rietzel in an interference proceeding. We think that the reasons underlying the decision in Rowntree vs. Sloan, *supra*, apply to the present case and that de Ferranti is accordingly estopped to assert priority over Harmatta."

After this case was submitted to the Trial Court the interference, de Ferranti v. Harmatta, was further reviewed on appeal, first by the Commissioner of Patents, and then by the Court of Appeals of the District of Columbia.

The Commissioner held that the subject-matter in issue was not disclosed in the de Ferranti British Provisional specification and awarded priority of invention to Harmatta on that ground. The Court of Appeals, without reviewing the Commissioner's finding as to the sufficiency of the British Provisional specification, held that de Ferranti was barred and estopped from receiving a patent because he had not made the claims of the issue within two years of the grant of the Rietzel patent of July 20, 1909, in which such claims had originated; basing its decision upon the holding of this Court in Chapman & Chapman vs. Wintroath, 252 U. S., 126, which decision it construed as placing a two years' limitation upon an ap-

plicant's right to make claims instead of the one year limitation which it, the Court of Appeals, had held applicable in the same case when before it (47 App. D. C., 247) and in the previous case of Rowntree vs. Sloan, 45 App. D. C., 207.

The opinion of the Court of Appeals is reported in 50 App. D. C., 393; 273 Fed., 357.

The decision of the Court of Appeals was, in our view, wrong, for two reasons, to-wit:

(a) It assumed that this Court in Chapman vs. Wintroath had decided that a two-years' delay in making a claim after its appearance in a prior patent was fatal, whereas it did not and could not have decided any such thing, the case before it not presenting any such question. In the case before it, the applicant's delay was only about nineteen months. The Court of Appeals applying the one year rule held the delay fatal. This Court overruled this one year rule, stating that, in analogy to many of the statutory provisions permitting at least two years' grace for action by an applicant or patentee the delay of nineteen months in the case before it was justified; which was a far cry from *deciding* that in no case was a delay of more than two years permissible.

(b) The Court of Appeals overlooked the fact that de Ferranti had in fact first claimed the substance of the issues in interference not without but well within two years, if that period were the legal limitation. The Board of Examiners-in-Chief so held in their decision. (p. 162, *ante*.) That this is so will be seen from a comparison of some of the claims made in the de Ferranti parent application (of which the application in the interference was a division) with claims of the Rietzel patent constituting the counts of the interference issue:

Claims, 1, 2, 3, and 4 of Rietzel Patent No. 928,701 of *July 20, 1909*, constituting the Issues of the de Ferranti-Harmatta Interference. (Rec., p. 1101.)

1. The hereinbefore described improved method of fastening two pieces of metal together by electrically welding them to one another at spots only of their juxtaposed or opposite faces by the application of pressure and heating current localized in such spots.

2. The herein described method of uniting two pieces of metal at a number of distinct or separate spots separated from one another by well defined areas of no union, consisting in applying pressure localized at the spots of desired union, and passing electric current through the pieces from one to the other while confining the flow of current to said spots until the union is effected.

Claims made on *December 5, 1910*, in de Ferranti's parent application No. 208,034 of May 14, 1904, of which the later application of December 29, 1911, involved in de Ferranti-Harmatta interference is a division. (Rec., pp. 1267-1273.)

8. A process for uniting two parts together consisting in utilizing portions only of the individual juxtaposed surfaces for the transference of electric heating current so as to limit the heating effect of said current substantially to said portions and applying pressure so as to unite the parts by a weld of less area than that of the juxtaposed surfaces.

9. A process for uniting two parts together consisting in utilizing portions only of the individual juxtaposed surfaces for the transference of an electric current, the utilized portions being prepared so as to localize the heating effect of said current and applying pressure to unite the parts by a plurality of isolated electric welds.

3. The herein described method of uniting two pieces of metal, consisting in pressing them together while passing a heating electric current from one to the other and localizing the flow of current and the heating throughout the operation in a spot or spots of circumscribed or limited area as compared with the area of the immediately opposed surfaces so as to limit the union of the pieces to a spot or spots.

4. The improved method of uniting two pieces of metal at a spot or spots only in their opposed meeting surfaces, consisting in pressing the two pieces together, and passing a welding electric current from one to the other while localizing the pressure in and confining the flow of current to the spot or spots of desired union, so as to produce an isolated spot or spots of union, leaving distinct or well-defined areas in which the pieces are not welded together.

10. A process for uniting two parts together consisting in leading an electric current across portions only of the individual juxtaposed surfaces of the parts and applying pressure to said parts so as to integrally unite the individual juxtaposed surfaces together by a plurality of isolated electric welds.

11. A process for uniting two parts together consisting in forming projections on the individual juxtaposed surfaces of said parts, leading an electric current across the parts by way of said projections and applying pressure to unite the individual juxtaposed surfaces by a plurality of isolated electric welds.

The exact words of the Rietzel claims were not used by de Ferranti in the drafting of his claims but there

cannot be the slightest doubt of the identity of the two sets of claims in matter of substance.

The later adoption by de Ferranti of the precise phraseology of the Rietzel claims for purposes of interference with Harmatta, who had copied and adopted such claims literally, was mere compliance with technical Patent Office procedure and cannot possibly operate prejudiciously to de Ferranti in matter of essential right.

The plaintiff will doubtless contend here, as it has done in the de Ferranti-Harmatta interference, that the first four claims of the Harmatta patent are limited to a process for uniting plane-faced plates and that de Ferranti does not disclose such a process but only a process for uniting pieces one or both of which are provided with projections through which the welding takes place; but the complete answer to this is that these four claims originated in the Rietzel patent and were inserted there to cover the welding of plane-faced plates as well as the welding of plates provided with projections; were copied by Harmatta for interference with Rietzel; were adjudged to belong to Harmatta over Rietzel in such interference, and the plaintiff, now claiming under Harmatta, is estopped to deny that they include a practice like de Ferranti of welding plates or pieces having projections through which the welding takes place.

We would here remark that the question of priority of invention as between de Ferranti and Harmatta is still open, notwithstanding the judgment of the Court of Appeals of the District of Columbia, de Ferranti and his assignee having filed a bill in equity against Harmatta and his assignee in the United States District Court for the District of Massachusetts under

Section 4915, R. S. U. S., for a review of such judgment.

It is only necessary to add that the defendant here is a lawful licensee, under the de Ferranti invention and application and has *pro tanto*, a right to all the protection that the law affords de Ferranti himself (Rec., pp. 1972, 1975, 1978, 1980).

What has been said in regard to de Ferranti's priority respecting the process or method claimed for Harmatta, applies equally well to the product or article claimed by him. Both process and product are anticipated by de Ferranti.

THE BEARING OF CHAPMAN & CHAPMAN VS. WINTROATH, 252 U. S. 126, ON THE HARMATTA PATENT AS A WHOLE

If our interpretation of the decision of this Court in Chapman & Chapman vs. Wintroath (p. 164, *ante*) be wrong and plaintiff's interpretation be right, then that decision must have a profound bearing on the validity of the Harmatta patent as a whole.

That case, as we have seen, came up from the Court of Appeals in the District of Columbia on writ of certiorari. The Court of Appeals had held that the delay of Chapman & Chapman in asserting the claims in controversy after a patent containing them had been issued to their adversary Wintroath nineteen months previously, constituted such laches and abandonment as to deprive them of a right to a patent, notwithstanding the fact that their application was filed earlier than the application for the patent of Wintroath first containing the claims. This Court reversed the judgment of the Court of Appeals on the ground that according to all time analogies to be found in the

patent Statutes and the decisions of this Court thereunder, especially in reissue cases, the applicants had two years within which to assert their claims, and because their delay was less than two years they were not barred.

While in Harmatta's case there was no patent claiming the identical subject-matter issued to an adversary more than two years before he made the claims now standing in his patent, there was a public use of the process covered by those claims and of the product covered by those claims, by his assignees and licensees, in this country, for over *five* years before any of those claims were introduced into his application and there was a publication and patenting of those claimed inventions by himself in Great Britain, France and other foreign countries more than *seven* years before the making of the claims in his U. S. application. There would seem, therefore, in Harmatta's case, to be present the full equivalent of a prior patenting for over two years claimed by plaintiff to be laid down in the Chapman case as constituting fatal laches or abandonment of right.

THE PRIOR SUIT ON THE HARMATTA PATENT AGAINST BARNEY & BERRY, INC., WAS FEEBLY DEFENDED AND OUGHT NOT BE GIVEN BUT LITTLE, IF ANY, WEIGHT.

On March 13, 1913, about three months after the Harmatta patent was issued, a suit for infringement of that patent was brought in the United States District Court for the District of Massachusetts by the Thomson Electric Welding Company (as owner) and Universal Electric Welding Company (as exclusive licensee) against Barney & Berry, Inc., a Massachusetts

Corporation, which latter was using in the welding of the parts of skates, an electric welding machine built and sold by The Toledo Electric Welding Company of Ohio.

The trial of that suit came on April 1, 1914, before his Honor, Frederic Dodge, District Judge, who, on March 24, 1915, found the patent invalid and entered a decree dismissing the bill of complaint (227 Fed., 428). Appeal being taken from this decree to the United States Circuit Court of Appeals for the First Circuit, that Court, on October 5, 1915, reversed the decree of the Court below and remanded the cause for further proceedings (227 Fed., 428; Rec., p. 5). Subsequently, to-wit, on July 17, 1916, an interlocutory decree was entered on the mandate referring the cause to a master to take and state an account (Rec., p. 1982). It does not appear that any final decree was ever entered in the cause. But it does appear that the cause was settled by agreement of the parties, without an accounting (see Pamphlet of Contracts, Rec., p. 805).

Those, other than the plaintiff and its licensees, engaged in the manufacture and use of spot welding machines have never had any confidence in the Barney-Berry litigation as settling the question of the validity of the Harmatta patent. Even the plaintiff itself has shown lack of dependence upon it, for, notwithstanding the decision of the Court of Appeals sustaining the patent, no suit on the patent, other than the present one, has ever been brought on it, out of the First Circuit, and, in the present suit, the plaintiff has not had the temerity to apply for a preliminary injunction, so impressed has it evidently been with the weakness of its position.

After the decision of the Circuit Court of Appeals, over four hundred manufacturers and users of spot

welding machines located in different parts of the country and representing many millions of invested capital, banded themselves together under the name of the "Welding Patents Investigating Committee," for the purpose of gathering materials of defense against the possible aggressions of the plaintiff (see Defendant's Exhibit Bulletin No. 21, July 17, 1917, offered Rec., p. 1001).

While the defendant has made several contributions to the fund raised by this committee, they were always paid with the distinct understanding that defendant would not be thereby bound to assist in the defense of any suit brought against any other contributor, and, consistently with this determination, defendant has itself borne all the expenses of this suit and has had full and exclusive control of the same (Hartman, Rec., p. 1000).

The general distrust of and failure to yield acquiescence to the decision rendered in the Barney-Berry case has been based upon the following considerations, among others:

(1) Barney & Berry, Inc., was but a nominal defendant in that case, while the real defendant was the Toledo Electric Welding Company, and its secretary and general manager, Mr. Frank Warren, was, before and during the trial negotiating with the plaintiff a plan of settlement inconsistent with a full, wholehearted defense of the suit (McBerty, Rec., p. 802; see also Defendant's Exhibit 72, Rec., p. 2073).

Immediately after the decision of the Court of Appeals in that case the plaintiff bought out the Toledo Electric Welding Company—lock, stock and barrel—took Mr. Frank Warren into its employment, at a salary of $7,500 per annum, for three years, and agreed to give Mr. Warren additional compensation out of all

sums received thereafter by plaintiff or any subsidiary company engaged in the electric welding business, to-wit, 15 per cent of the first $50,000; 10 per cent of the second $50,000, and 5 per cent of all additional amounts received.

(2) Although the prior knowledge and use of Rietzel was well known to plaintiff and, presumably, to defendant in that case—the file wrapper of the Rietzel application for patent disclosing it—such knowledge and use was apparently deliberately suppressed and not brought to the attention of the Court in that case.

(3) Although the prior knowledge and use of McBerty set up in this case was known to plaintiff and defendant in that case, the same was likewise suppressed and not brought to the attention of the Court.

(4) Although the prior invention of de Ferranti and the existence and pendency of the Harmatta-de Ferranti interference were well known to both plaintiff and defendant in that case, the same were suppressed and not brought to the attention of the Court.

(5) Although the practicability of roller electrodes for carrying out the process was well known to plaintiff in that case and asserted by Harmatta himself, attempt was made to deceive the Court in this particular.

(6) The fact that in that case the Thomson patent No. 496,019 was attempted to be disposed of as embodying a mere process of soldering and not a welding process, although the plates described as being united by electric current and pressure were iron plates coated with tin—the only material, specifically designated anywhere by Harmatta, to-wit, in the Harmatta French patent No. 336,187, as composing the plates proposed to be united by his process.

(7) The fact that it was generally believed that Judge Dodge was right in holding that the roller-elec-

trode patent of Thomson, No. 444,928, constituted a complete anticipation of the Harmatta patent, notwithstanding his reversal on appeal as to this point by the Court of Appeals.

(8) The fact that the Lemp patent, No. 553,923, owned by the plaintiff and well known to the defendant in that case, was not set up at all, though constituting a clear anticipation of the Harmatta patent.

(9) The fact that in that case the Kleinschmidt patent was attempted to be disposed of as an anticipation of Harmatta on the basis of disclosing only the production of *big* spot welds instead of small spot welds, the plaintiff and defendant both well knowing that the size of the welds had nothing to do with the claimed process, or the claimed product of Harmatta, as established in this case.

(10) The fact that in that case the Robinson patent, No. 574,942; the Burton patent, No. 647,694; the Parkinson British patent, No. 14,536, of 1894, were entirely overlooked, or not exploited, as anticipations of the Harmatta patent.

(11) The fact that in that case the Benardos German patent No. 50,909 was not presented in its true bearing as an anticipation of the Harmatta patent.

(12) The fact that in that case the estoppel growing out of the assertion by plaintiff of the prior invention of Rietzel as a means for securing the grant of the Rietzel patent over the foreign anticipating disclosures of Harmatta and for securing to Rietzel a "look-in" in the Rietzel-Harmatta interference, was not urged against the plaintiff, though known to the defendant in that case. The Trial Court in the case at bar, was impressed with defendant's criticisms of the Barney-Berry case and so expressed itself (p. 27).

Judge Dodge's Decision

Notwithstanding the fragmentary and partial exhibition of the prior art in the Barney-Berry suit, Judge Dodge found enough in the prior patents laid before him, and particularly in the Thomson roller-electrode patent, No. 444,928, and in the Kleinschmidt patent, No. 616,436, to invalidate the Harmatta patent. Of the Thomson patent he said (227 Fed., p. 431):

> "Referring again to the Thomson patent, No. 444,928, the process therein described, while it is said to be 'especially applicable to the welding of plates together at their edges, instead of riveting,' is just as applicable to the welding of plates or sheets at other places within their area as at their edges. The roller electrodes employed, when brought together on each side of the work, and until something more is done, will pass the electrict current and make the weld at the spot or point of pressure and nowhere else. (See claim 1 of the patent referred to.) If, having then made the weld, they should be again separated, instead of having the work fed between them while their pressure upon it continued, they would leave an isolated spot weld joining the plates and be in readiness to make another weld isolated from the first by any desired area of unwelded surface.
>
> "The plaintiffs say that although machines were built to carry out the roller process of the last mentioned patent, they were not practically successful and that the process has proved a failure so far as commercial success is concerned. Their evidence tends to support this contention and to show that there are practical difficulties attending the use of the process. But so far as the question raised is important, I think the plaintiff's evidence tending to show want of success is fully met by that of the defendant; according to which the process has been successfully carried

out by machines built and commercially installed by at least two different concerns. Samples of the work they have produced by using it are among the exhibits in the case and there is nothing to show that such work is unsatisfactory in character."

Had the learned judge been fortified, further, by the admissions of plaintiff's witnesses, in this case, he would not have felt the need of even discussing the practicability of practicing the Harmatta process by means of roller electrodes.

(Gravell, Rec., p. 103, X-Q. 191; p. 104; X-Q. 199, *et seq.;* Knapp, *Ibid.*, p. 221, X-Q. 27, *et seq.;* Knapp, Jr., *Ibid.*, p. 233, X-Q. 20, *et seq.;* Clark, *Ibid.*, p. 263, X-Q. 114 *et seq.;* Thomson, Rec., p. 532, Q. 28.)

But the learned judge did not overlook the fact that Harmatta himself had asserted the entire practicability of practicing his process by means of roller electrodes, and had, in fact, described roller electrodes as the principal, and pin electrodes as the mere incidental or subordinate, means of carrying out his process.

We quote from his opinion on this point, as follows (227 Fed., p. 432):

"As has appeared, the application was pending for ten years before the patent issued.

"As originally filed the application described a process of roller welding substantially like that of Thomson, with the statement toward the close of the specification that, instead of introducing the piece to be welded gradually between the electrodes, the welding apparatus might be arranged to slide relatively to them, and that if required

to weld sheets only at particular places, apparatus employing electrodes and having the form of pins might be used, instead of the roller electrodes, to produce 'a small, round, very sharply defined place of welding,' answering the purposes of a rivet.

"There were two claims covering roller welding and two others not thus limited. The idea of roller welding thus appears to have been with Harmatta the foundation and origin of his further idea of spot welding, and his further idea to have consisted in nothing more than stopping with the first point welded instead of continuing it into a welded line."

The Decision of the Court of Appeals for the First Circuit

As compared with the well reasoned opinion of Judge Dodge, the opinion of the Court of Appeals, written by Judge Putnam, makes a poor showing.

It swallows, bait, hook and sinker, the plaintiff's contention that the roller electrode process is entirely impracticable and throws the Thomson roller electrode patent No. 444,928 and Harmatta's evidently preferred form of roller electrode apparatus disclosed in his original application and in all his foreign patents, into the discard, contrary to the weight of evidence in that case and the full admission of plaintiff in this one.

It errs in its statements as to what the record contained, indicating (what was probably the fact) that the record had never been read. It says (Rec., p. 7):

"The patent was applied for on December 3, 1903, and was not issued until December 3, 1912, *but the claim for spot welding was always in the application.*"

Now, the fact is, that of the four claims originally sworn to by Harmatta, the first two covered, respectively, a process and an appartus which entirely disregarded the form of electrodes employed or the welding in disconnected spots as distinguished from the welding in a line. They read (Rec., p. 1361):

> "1. The process of electric welding, consisting in employing the electrodes not only to conduct the current to the objects being welded, but also to exert a regulable pressure on the same, substantially as described.
>
> "2. An electrode apparatus for electric welding, comprising two electrodes between which the objects to be welded are introduced and means whereby one of the electrodes can be approached to and receded from the other, substantially as described."

The two other original claims (3 and 4) were, as we have seen, directed specifically to the roller electrode apparatus only.

The opinion of the Court of Appeals goes on further to state:

> "The alleged infringing machines were first constructed in 1908; *in 1910 the application covered both spot welding and line welding.* It was then amended by striking all claims for line welding," etc.

This was an inaccurate and untrue statement. By the amendment of May 14, 1904, everything relating to line-welding, *i. e.*, description, claims and drawings, was stricken from the Harmatta application and *never* thereafter reappeared in it!

From the whole temper of the Court of Appeals'

opinion, the impression is gained that the Court thought defendant's whole case rested upon the roller-electrode defense and that it had been shown that all roller electrode apparatus were impracticable and had been jettisoned, even by Harmatta, for that reason—contrary to what we now know and what the plaintiff's witnesses in this case admit to be the fact.

It is apparent, therefore, that, had the evidence now in this case, on this point only, been before the Court of Appeals in Massachusetts, a different result would have been reached by that Court, to say nothing of what would have been the effect of the other defenses of prior patenting, prior invention, estoppel, etc., brought forward, for the first time, in this case, had they been duly presented for the consideration of that Court.

THE PROCESS OF SPOT WELDING, SO-CALLED, OF HARMATTA IS BUT A NORMAL AND EXPECTED APPLICATION OF ELECTRIC RESISTANCE WELDING AND INVOLVES NOTHING PATENTABLE

Any one who, at any time or place, fastened two pieces of metal together by electrically welding them to one another at a spot or spots only of their juxtaposed or opposite faces by the application of pressure and heating current, localized in such spots, practiced the essentials of the, so-called, Harmatta spot welding process.

Eliminating the idea of a welding at a spot or spots comprising less than the whole of the juxtaposed surfaces of the parts to be united, we have nothing but the original Thomson butt-welding process, so-called, of 1886; but, keeping in mind and applying that idea, we

find that the process was practiced long before Harmatta, by Thomson, by Lemp, by Robinson, by Kleinschmidt, by Burton, by Perry, by de Ferranti, by Parkinson, and by still others, whose prior dates are established by record evidence; and also by Rietzel and by McBerty, whose dates are fully and satisfactorily established by the testimony offered in this case.

(a) So far as the nature of the metal parts acted upon is concerned, it matters not of what metal they are composed—they may be of any metal, as suggested by Thomson in his patents Nos. 396,015 and 444,928, by Burton in his patent No. 647,694, and by Benardos in his patent No. 50,909, or of tinned iron as suggested specifically by Thomson in his patent No. 496,019, and by Harmatta in his French patent, 336,187, or of zinc-coated metal, as in Perry, 670,808.

(b) The parts to be united may be metal in sheets of uniform thickness, as suggested in Thomson, 396,-015 and 444,928, in Burton, 647,694, and in Lemp, 553,-923, or in very thin metal sheets, as suggested in Thomson, 496,019, and in Benardos, 50,909; or thin pieces may be united to thicker pieces as suggested in Robinson, 574,942, and in Kleinschmidt, 616,436. When plates are to be united they may be plane-faced, throughout, as in Thomson, 444,928, Lemp, 553,923, and Benardos, 50,909; or they may be provided with projections on both parts, as in Rietzel, 928,701, or with projections on one part only, as in Robinson, 574,942, Kleinschmidt, 616,436, and Rietzel, 928,701. Cylindrical wires may be the material operated upon, as in Perry, 670,808.

(c) The electrodes may be of any suitable material, that is to say, copper as suggested by Burton, 647,694, and Parkinson, 14,536, or of iron, as suggested by

Thomson 496,019, or of steel, iron or copper faced with hard carbon, as in Thomson 496,019, or of graphite, prepared carbon, mixture of clay with carbon, magnesium, iridium, carbon with thin metal coatings, as suggested by Benardos, 50,909.

(d) The form of the electrodes is immaterial. They may be rollers as in Thomson, 444,928; Lemp, 553,923; and as suggested in Harmatta's original specification and in his British and French patents; they may be pin-shaped, as in Benardos, 50,909; in Burton, 647,-694; and as in Harmatta; or they may be flat, as in Rietzel, 928,701; Parkinson, 14,536; Robinson, 574,-942; and Kleinschmidt, 616,436; or concaved, as in Perry, 670,808. They may be pin-shaped and pointed as in the Harmatta patent; Benardos, 50,909; and Thomson, 496,019 (Figs. 12 and 13), or of cylindrical form and not pointed as shown in the drawings furnished with the first alleged foreign machine imported into this country (Plaintiff's Exhibit No. 8, Drawings of Machine Bought by National Co. from Silesia Co. A B C) (Rec., p. 125).

(e) It is assumed that the current must be of low voltage and large quantity, and that it is to be adapted to the electrodes used and the character of the work to be operated upon. In his original specification Harmatta gives no specific directions as to current, and in his patent, as granted after attorney's amendment, it is stated:

(Page 2, column 2 of patent specification.)

> "The time and duration of pressure and heating and the amount of pressure as well as the volume of current for effecting the weld can be readily determined by experiment for different thicknesses of metal and as well understood in the art of electric welding to which my invention relates."

While each individual worker in the art may have devised or invented some slight change or improvement in some particular part of the apparatus, the use of none of such special parts altered the essential nature of the process, as such practiced by their use for electric welding.

When, therefore, in the natural and normal development of the art of resistance welding, occasion arose to unite two flat plane-faced plates or parts of metal, at one or more spots instead of across the whole of their proximate faces, it was, we submit, but the adoption of a perfectly obvious expedient to employ relatively small electrodes for the purpose.

In proof of this, without either having knowledge of the work of any of the others, Thomson, in 1893; Rietzel, in 1897-8; Benardos, in 1889-90; McBerty, in 1901; and Harmatta, in 1903, each independently and, as we contend, without the exercise of a particle of patentable invention on his part, hit upon this same expedient.

The fact that many, operating absolutely independently, reach a result in the same way, has often been held to evidence a *lack* of invention.

Bromley Bros. Co. vs. Stewart, 51 Fed., 912-916;
Haslem vs. Pittsburgh Plate Glass Co., 68 Fed., 479-481;
National Tube Co. vs. Spang, 135 Fed., 22-29, Affd., 135 Fed., 351;
Elliott & Co. vs. Youngstown Car Mfg. Co., 181 Fed., 345-349;
Walker on Pats., 5th Ed., p. 27.

It is significant that neither of the early workers in the art referred to ever thought he had made an in-

vention when he first welded together metal plates in spots by means of pin electrodes as distinguishd from electrodes of other forms, or ever thought of applying for a patent for either the process or product resulting from the use of such pin electrodes.

Harmatta himself, although he applied for patents all over the world (see his preliminary statement, Rec., p. 1846), never originally specifically claimed, in any country, the use of such electrodes (see his British application, Rec., p. 1124; his French application, Rec., p. 1146; his Canadian application, Rec., p. 2042; and his original U. S. application, Rec., p. 1361), although he did claim roller-electrodes specifically in all of those applications.

It is also significant that Harmatta never succeeded in getting a foreign patent, even on his machine, and of course, not on his alleged process or product, in any country where an examination for novelty was made, and where patents were not granted as a matter of course.

In his own country, Germany, where a careful examination for novelty is always made, a patent was refused his assignee, William Egel (who also took the French patent No. 336,187, Rec., p. 1144). See Harmatta's Oath, p. 1364; Harmatta's preliminary statement, p. 1846; and "Patentblatt," pp. 2086 and 2092. In Canada, where an examination is also made, a patent was likewise refused. And, as we have seen, a patent was consistently refused him, for over five years, in the United States, and it was only after novelty had been accorded Rietzel (in apparent ignorance on the part of the Patent Office Examiner of the prior work of Robinson, Burton, Bernardos and others) that the Patent Office, with evident reluctance, gave him a

patent. In this connection, it should be noted that the Examiner who finally passed his case, sought to shift the responsibility for so doing upon the Examiner who had previously acted upon it. (Rec., p. 1435.)

THE ENORMOUS EXTENSION AND COMMERCIAL DEVELOPMENT OF THE ART OF ELECTRIC RESISTANCE WELDING, OR, SO-CALLED, SPOT WELDING, IS NOT ATTRIBUTABLE TO HARMATTA

In the Barney & Berry suit, it was proven that the practical art of spot welding plane-faced plates or parts together was practiced, commercially, by others before it was practiced by Harmatta or by the Thomson Electric Welding Company, and before the last-named company knew of or had acquired any rights under Harmatta's U. S. application.

In his opinion Judge Dodge said (227 Fed., p. 432):

> "Under its butt-welding patents and roller-welding patent the Thomson Company appears to have had a complete monopoly of electric welding. The latter patent expired January 20, 1908. While the monopoly continued, electric welding machines could only be had under lease from the Thomson Company, restricting their use to specified articles.
>
> In 1908 the Toledo Electric Welder Company, which made the machine which the defendant uses, and is defending this suit, began to make and introduce machines for spot welding. Other concerns followed in 1908, 1910 and 1911, all acting without knowledge of previous applications by Harmatta or others for patents covering the spot-welding process. Upon these circumstances it can hardly be said that, upon the question of patentable novelty in anything invented by him, Har-

matta is supported by any advantages which the development of spot welding since 1908 has shown to reside *in the process*, or by any commercial success it has attained. I do not think the facts shown entitle him to say that by his alleged invention, as he was finally obliged to define and limit it, he was the first to supply a widespread demand not previously met."

In the present case, we have testimony to the same effect.

Mr. Rietzel testified as follows (Rietzel, Rec., p. 638):

"Q. 35. How early was the spot welding of plane plates not provided with projections on either of their meeting faces, an established practice in the art to your knowledge?

A. I don't believe I can give any definite time and date, but I think it was three or four years after, or more, than when I made the first specimens. In fact, I only can remember of doing some commercial work, I think it was in the year 1906. There may have been some previous to that time, but I can't recall now."

Mr. Clark, a witness for the plaintiff, testified as follows (Rec., p. 261):

"X-Q. 87. You don't know who got up the design for the first spot-welding machine that was constructed or used at the Lynn factory, do you, for the Thomson Electric Welding Company?

A. I do not; it was in Mr. Rietzel's time.

X-Q. 88. And it may have been him?

A. Possibly.

X-Q. 89. When Mr. Rietzel left the Thomson Electric Welding Co. he went to the Universal Electric Welding Company, did he not?

A. Yes.

X-Q. 90. That was some time in 1907, was it not?
A. I think about that year."

McBerty, for the defendant, testified as follows (Rec., p. 742):

"Q. 198. When, to your knowledge, was a spot-welding machine for welding flat plane-surfaced plates together by pressure and current applied to one or more electrodes, first put upon the market?
A. I would say that line of product was put upon the market along about 1908. It is rather difficult for me to say.
Q. 199. What machines first appeared on the market for doing this spot-welding, so-called, and who put them out?
A. The Winfield Company manufactured the first spot-welding machine that I knew.
Q. 200. When was that?
A. That was along about that time—1908."

Gravell, a witness for the plaintiff, testified as follows (Rec., p. 70):

Answer to X-Q. 32:
" * * * The first time I came in contact with spot-welding as described by me was at the Hale & Kilburn Co., in 1910.
X-Q. 33. In 1910 was what you now call 'spot-welding,' arrived at empirically by you or did somebody communicate the idea to you?
A. While I was employed by the Hale & Kilburn Co. in the early part of January, 1910, they had already been using spot-welding for some little time.
* * * * *
X-Q. 35. Then it was from Hale & Kilburn that you first learned of spot-welding. Am I right about this?

A. That is right, but having been to the factory of the Hale & Kilburn Co. some months previous to my employment by them, I first saw spot-welding in their plant at that time."

Taylor, a witness for defendant, testified that Winfield spot-welders were sold and on the market as early as 1908 (Rec., p. 898, Q. 72).

It is not, therefore, to the invention of Harmatta, nor to the work of his assignee, the Thomson Electric Welding Company, plaintiff's predecessor, that the successful introduction and great commercial success of spot-welding, so-called, is attributable.

If Harmatta and his work had never been known in this country that development would have taken place, just the same, and, once started, could not have been stopped, any more than it can now be stopped.

With the growing scarcity of wood, the urgent demand for the use of sheet metal as a fire protection, the general availability of electric current, the expiration of the basic, dominant Thomson electric welding patents, and the appearance on the market, concurrently with these conditions, of numerous modern, up-to-date, scientifically constructed resistance welding machines, adapted especially to the convenient and expeditious welding of thin metal plates and of all sorts, kinds and shapes of small metal parts where great strength of union is not required, spot-welding, so-called, has grown apace (McBerty, Rec., p. 744; Thomson, Rec., pp. 543-544). It was not, however, until after the Harmatta patent had been sustained by the Court of Appeals that the Thomson Electric Welding Company, and later its successor, the plaintiff (composed now mainly of lawyers, Rec., p. 816) got into the field, to any appreciable extent, and using, speculatively, the

adjudication of the patent, as a club, undertook to hold up the entire commercial world and make all users of spot-welding machines pay enormous tribute, amounting now to $250 per year, for each machine.

The vigorous defense of this suit is a protest against such conduct.

There is one other thing that should be mentioned in this connection.

In the present suit, testimony has been offered by the plaintiff, tending to show that two spot-welding machines provided with pin electrodes were imported into this country from Berlin, Germany, in the forepart of the year 1905, by the National Enameling & Stamping Company, and installed at the latter's factory, at Baltimore, Md., where they have been in use ever since (Knapp, Rec., p. 124; Herring, *Ibid.*, p. 130; Knapp, *Ibid.*, p. 217; Knapp, Jr., *Ibid.*, p. 230; Herring, *Ibid.*, p. 229). These machines, though not strictly proven to have emanated from Harmatta, were said to have been procured from a German concern that purported to control Harmatta's German rights. Further evidence was offered by the plaintiff tending to show that the National Enameling & Stamping Co., using these two machines as models, caused fifteen other machines like them to be made, for its own use, and that they were so used at its different factories, all in the year 1907 (Knapp, Jr., *Ibid.*, p. 232).

Why this evidence was not availed of in the Barney-Berry suit has not been explained.

That the plaintiff knew of the existence of the machines and of their use by the National Enameling & Stamping Company is established by the fact that, on November 17, 1910, over two years before the Barney-Berry suit was instituted, the Thomson Electric Weld-

ing Company (as owner) and the Universal Electric Welding Company (as licensee) brought suit on the Rietzel patent, No. 928,701, charging the use of those very machines by the National Enameling & Stamping Company to be an infringement of the said Rietzel patent (Rec., p. 1986; Knapp, p. 227, *et seq.*), which suit was subsequently discontinued on the defendant taking a license from the plaintiff (Knapp, Rec., p. 229).

The plaintiff may have thought that the disclosure of the existence and use of these machines, in this country, as early as 1905 would show a public use for profit more than two years prior to the making of either the process or product claims of the Harmatta patent, and thus raise an uncomfortable bar, difficult to handle; but, whatever the plaintiff's motive may have been, the fact remains that the introduction of the machines from abroad and their duplication, subsequently, does not enable the plaintiff in this case to truthfully say that the great commercial extension of resistance or spot-welding was attributable, directly or indirectly, to the work of Harmatta, or his assignees. The use by the National Enameling & Stamping Company appears to have been confined to its own factories.

SPOT WELDING BY McBERTY IN 1901

It appears that, in the early days, every one who first began to use an electric resistance welding machine for the, so-called, butt-welding of metal bars or plates, end to end, sooner or later, and naturally, drifted into its use for the welding of plates or bars, flatwise, face to face. The use, for one purpose, seems to have suggested the other. Each operator appar-

ently reasoned that if he could weld the ends of plates together, he could also weld their side faces, or as much of such faces as he desired, together.

Thomson, Lemp, Rietzel, Robinson, Kleinschmidt, Burton, Benardos, and others all caught this idea and proceeded, by the use of slightly differing forms of apparatus, to apply it. Another to do the same thing was Mr. Fred P. McBerty, of Warren, Ohio.

The history of his work occupies a considerable portion of the record. There can be no doubt whatever that he repeatedly spot welded according to the, so-called, Harmatta process, as early as 1901,—before the earliest work of Harmatta—and the principal controversy, as to him, has been as to the *amount* of work that he did at that time. We may say, however, in passing, that if he practiced the invention, at all, even in a single instance, and disclosed it to others so that they could and did also practice it, he, under the authorities, completely anticipated Harmatta.

Egbert vs. Lipman, 104 U. S. 333;
Coffin vs. Ogden, 18 Wall. 120;
Brush vs. Condit, 132 U. S. 39;
U. S. Mineral Wool Co. vs. Manville Covering Co., 125 Fed. 770.

Mr. McBerty was, at the critical period, a mechanical engineer and little versed in the science of electricity. From 1898 until 1902 he was the superintendent of the plant of the Warren Electric & Specialty Company, of Warren, Ohio, a concern that manufactured and sold incandescent lamps, transformers, desk fans and ceiling motor fans. Up to 1901, the Company made desk fans in which the spiders, the fan blades and guard wires were all composed of brass,

the blades,—four in number,—of each fan being connected to a corresponding number of arms of the fan spider by means of rivets, applied in the usual manner. The guard wires of these fans were secured at their abutting ends in a variety of ways, as, for example, by slipping a metal sleeve over both ends of the wires and soldering the parts in position; or by milling or reducing the ends of the wires and lapping them, and then pinning them together, completing the joint by solder; or by drilling a hole in the end of each wire, slipping a pin in the holes thus formed, to hold the ends in alignment, and then soldering the joints. Fans of this description are shown in the 1900 Catalogue issued by the company of which a copy is in evidence (See Defendant's Exhibit No. 1, 1900 Catalogue of the Warren Electric & Specialty Company," offered Rec., p. 674.)

In the latter part of 1900, the Company concluded to add to its output a cheap grade of fan which should sell for a price less than that charged for its other fans, and it was determined that these cheap fans should have the fan blades, spiders and guards constructed of steel. Mr. McBerty had read some descriptions of the construction and operation of Thomson butt welders, and, supplementing this knowledge with information derived from Mr. Edward B. Craft, an electrical engineer employed by the Company, he designed and had built an electric welding machine, with a view, primarily, to butt-welding together the ends of the steel guard wires that were to enter into the construction of the new fans. This welding machine was the first that had ever been installed at the factory and, in fact, the first one that Mr. McBerty had ever actually seen. It fulfilled its original pur-

pose admirably. The witnesses on both sides agree that steel guard wires were successfully welded by means of it in 1901 (McBerty, Rec., p. 715, *et seq.*). Little, Rec., p. 311; Spade, *Ibid.*, p. 314; L. C. Brewer, *Ibid.*, p. 271, *et seq.*; C. R. Brewer, *Ibid.*, p. 285; Wolfe, *Ibid.*, p. 249.

With this, to him, perfectly novel electric welding apparatus to play with, it was inevitable that, sooner or later, Mr. McBerty should, like previous users of butt-welders, come to the welding of metal plates, face to face. As a matter of fact, after accidentally discovering that he could weld pieces of sheet steel scrap together, it occurred to him that he could weld his steel fan blades to his steel spider arms by applying pressure and current to them, at spots, and thus form a union that would answer the purpose of rivets. Just how this came about is best told in his own language (Rec., p. 716):

"Q. 45. And after you had successfully welded the ends of the guard wires on this steel-bladed fan, how came you to arrive at the conclusion you could also weld the fan blades and spiders?

A. That was the result of an effort on my part to electrically weld copper wire of a reasonable cross section, approximately the same cross section as the guard wires.

* * * * *

Q. 47. You mean to butt weld them?

A. Yes, sir.

Q. 48. You may go on with your illustration.

A. When I tried this operation, I was not successful in making a weld; I did not seem to get the heat necessary to fuse the projecting ends. This led me to believe I did not have sufficient resistance at the point of contact between the abutting ends of the copper wire, but I did know that this

resistance was generated by heat on the iron wires; to get, therefore, practically the same effect on the two copper wires, as I did get on the two iron wires, I put pieces of sheet steel, small pieces of sheet steel, between the abutting ends of the copper wire; the copper wires were clamped in position in the jaws; small pieces of steel placed between the abutting ends, pressure applied; with the aid of the lower clamp to move the swinging plates toward each other, and turn on the current, and while I generated heat, apparently lots of it, I did not weld my copper wires, *but I did weld my two steel plates.*

Q. 49. How did you expect to weld the two copper wires with the steel plates interposed between them?

A. My impression was that the resistance of the the steel plates would generate sufficient heat which would be communicated to the copper wires to bring them up to the fusing point, and the pressure applied would force out the steel plates which would melt up, and I would have a weld.

Q. 50. You mean you expected the copper wires would pass through the steel plate after a proper degree of heat?

A. Yes, sir; after a proper degree of heat, or they would burn up or melt out the steel plates.

Q. 51. So that the ends of the copper wires would come in contact?

A. Yes, sir; the ends of the copper wires would come in contact.

Q. 52. And be sufficiently heated to weld?

A. Yes, sir.

Q. 53. Tell us again what the result of that trial was.

A. The steel plates came up to a welding heat on their two meeting surfaces, but my copper electrodes did not come up to a welding heat, when I cut the current off. Since that experiment was not successful, I found I had made a perfect weld between the two steel plates.

Q. 54. Now, how did you utilize that discovery, if at all?

A. After repeated experiments, or repeated demonstrations, of the process to enable me to get a good idea of the strength of a union of that kind, it appeared to me that could be used to replace or to take the place of the rivets in the steel blade guards or centers.'"*

Following up this discovery as to what could be done in the way of uniting two plates, face to face, by his electric welder, Mr. McBerty proceeded to slightly modify his machine so as to conveniently weld the steel fan blades of his new fan to the steel spiders or centers. This modification consisted in inserting and holding in the clamps originally designed to hold the ends of the steel guard wires, a pair of co-operating copper electrodes, and, by first clamping the fan blades and spider arms to be united between these electrodes and then turning on the current, a weld was made at the point of application, answering the purpose of a rivet (Rec., pp. 717 and 721). The number of welds formed was, of course, determined by the number of applications of pressure and current to the work, through the instrumentality of the electrodes, in the manner described.

*It is a curious coincidence that what Mr. McBerty tried to do, *i. e.*, burn through steel plates so as to bring the copper electrodes together, but did not succeed in doing, Mr. Gravell, plaintiff's expert witness, succeeded, though inadvertently, in doing, in admirable fashion, at the test made by him at Detroit in the presence of his Honor, Judge Killits. Mr. Gravell on that occasion walked up to a perfectly new, modern, up-to-date spot welding machine, and, placing two large, clean, superposed steel plates between the electrodes, applied to the plates pressure and current long enough to burn a hole clear through the plates (see "Plaintiff's Exhibit 26, Large Sample of Spot Welding," Rec., p. 268), so that the electrodes came in contact with each other! Mr. McBerty apparently had not sufficient current, while Mr. Gravell used too much.

When Mr. McBerty had demonstrated the feasibility of uniting the fan blades of this cheap fan to the spider arms, by welding, his project was so well thought of that he made up fifteen or sixteen fans in this way, put them through the usual tests, common to other fans, and they were then disposed of as a part of the regular output of the factory. Furthermore, in getting up the Company's catalogue for the season of 1901, a cut was made of this cheap fan and the same was designated as the G-2 fan and referred to as an "ironclad" fan. When, however, it came to discussing the subjects of actually putting out this cheap fan, in quantities, it was decided that the former practice of riveting the fan blades to the spiders should be continued, first, because the Company had all the appliances for punching the rivet holes in the parts and for applying the rivets; secondly, because the workmen were familiar with such old methods of attachment; thirdly, because more welders and jigs would have to be built if welding were adopted, one welder not being sufficient to do all the work required; fourthly, because it would involve the carrying of double stock, namely, blades and centers adapted for riveting and other blades and centers adapted for welding. Another consideration that probably had some weight with Mr. Gilmer, the General Manager, was that the broad generic art patent of Thomson was still in force and covered all applications of resistance welding and to continue to spot-weld the fan blades would be to invite a law suit. Notwithstanding the very limited quantity of spot welded fans that were put out during the season of 1901, they were not only advertised and shown in the Company's catalogue of 1901, as "Ironclad" G-2 fans, but were likewise advertised, as thus

shown, in a trade journal, called the "American Electrician," in the issue of April, 1901, page 163 (Rec., p. 772), and continued to occupy a place in the advertised output of the Company contained in the Company's catalogue for 1902 (Rec., p. 728).

Quite a number of reliable witnesses testify to the building of the welder in 1901 and to its use during that year, both for the *butt welding* of the steel guard wires of the G-2 fans, and for the *spot welding* of the fan blades to the spiders. We give below brief references to the testimony of these witnesses.

Fred P. McBerty

Mr. McBerty testifies in detail to the construction of the welder and its use for butt welding (Rec., p. 715), also to the modification of the machine for spot welding and to the manner in which spot welding of the fan blades to the spiders took place (*Ibid.*, p. 717, *et seq.*). He says the spot welded fan blades were tested and found to be satisfactorily united to their spider arms, and he gives the details as to the manner in which the welds were tested (*Ibid.*, p. 723). He tells us that the spot welding of the blades was regarded as a realization of the directions given him to produce a cheap fan (*Ibid.*, p. 724). He tells of the making of the cuts of the spot welded fan for the 1901 Catalogue (*Ibid.*, p. 724). He points out that, whereas all of the other fans shown in the 1901 Catalogue disclose the fact that the blades are riveted, the cut of the G-2 fan shows no rivets (*Ibid.*, p. 725). He says that fifteen or sixteen of the G-2 fans were shipped out and disposed of as regular product (*Ibid.*, p. 726). He explains in detail the discussion between himself, Mr. D. W. Gilmer, the general manager, and Mr. Jasper

Powers, and the arguments advanced why the ordinary method of riveting should not be displaced by spot welding, as follows (*Ibid.*, p. 727):

"Q. 107. Why, if you know, were not more of this type of fan with the spot-welded blades and spiders put out?

A. That was a matter that was discussed between D. W. Gilmer, the general manager of the Warren Electric & Specialty Company; Mr. Jasper Powers, the production man, or machine shop superintendent, of the Warren Electric & Specialty Company; and myself. We had to get out a certain number of fans in a given time. We got our sample fan completed, and the matter of spot welding the blades was taken up with Mr. Gilmer and with Mr. Powers, Powers being the mechanical man, having in charge the production of the metal parts of the fan, and he rather insisted that we stick to the older method of riveting, due to the fact that he had the punches made for punching his centers, and punching his blades. He had operators skilled in putting these blades in position, and could go through all the regular processes without any interference at all, it was standard, whereas, if they had to be spot welded, it meant an electric welding machine with capacity enough to take care of our current for welding both the blades and spiders and required considerable time, particularly if we got what we call a hot season, and be compelled to produce a lot of fans, and again, he would have to purchase jigs for holding the blades in position, and also another welding machine, to give us capacity to take care of the product. All those would involve an outlay of considerable money, which was quite an object with us, and the delay, due to the production of the additional machine, jigs, and furthermore, it would compel us to carry a line of fan blades which were punched ready for the

> brass rivets, a line of centers already punched, and a line of blades not punched, and a line of centers not punched, thus compelling us to carry duplicate stock, which we always avoid if we can. The final result was they overruled my spot-welding idea, sticking to the riveting for that season, with the definite understanding if anybody wanted spot-welded blades we would be in a position to weld them."

He explains the perpetuation of the cut of the G-2 fan in the catalogue of 1902, and that the G-2 fan of that catalogue is the only one which does not show the blades riveted to the spider arms (*Ibid.*, p. 728). He points out, further, that the guard rings of the G-2 fans illustrated in the 1902 Catalogue show no joint, thus indicating that they were electrically welded (*Ibid.*, p. 729). He explains that the 1903 and 1904 catalogues issued by the Peerless Electric Company—that succeeded to the fan business of the Warren Electric & Specialty Company—omit the illustration of the G-2 fan shown in the 1901 and 1902 catalogues, indicating that all of the fans put out during those years had the blades riveted (*Ibid.*, p. 730). He explains the diligent efforts that he has made to recover one of the spot welded G-2 fans put out in 1901, showing that most careful investigation had been made through searchers sent to different parts of the country and through elaborate schemes of advertising (*Ibid.*, p. 731). He states where the transformer was obtained that was used in connection with the welder, and names a number of witnesses who were familiar with his spot welding practice in 1901, including in the list, Captain William E. Smith, Mr. McDonold, the motor tester, and Mr. E. B. Craft, the electrical engineer, now connected with the Western Electric Company (*Ibid.*, p. 732).

He says that Jasper Powers was the man who built the welding machine under his direction (*Ibid.*, p. 732). He produces a specimen of work done by him in 1901, consisting of a spider arm and fan blade spot welded together, the same being marked "Defendant's Exhibit M" (*Ibid.*, p. 737). This was one of the first satisfactory specimens of spot welding that he made (*Ibid.*, p. 735). It bears a date mark, "2-15-01," which he says means Feb. 15, 1901, and was applied by him to the specimen on that date (*Ibid.*, p. 736). It also bears the impression of a stamp reading "F. McBerty," which he says was applied at the same time (*Ibid.*, p. 737). The stamp itself is offered in evidence as "Defendant's Exhibit L" (*Ibid.*, p. 737). He says this specimen "Exhibit M" originally formed part of a center or spider having two spot welded blades attached, and that when his company, the National Electric Welder Company, was threatened with suit under the Harmatta and Rietzel patents in December, 1912, he cut the center in two, retaining the part which now constitutes "Exhibit M" and sending the other part embracing a part of the center and one blade spot-welded thereto, to his attorney, J. Nota McGill, of Washington, D. C., (*Ibid.*, p. 739). He produces a letter dated January 29, 1913, in which Mr. McGill asks him to send him one of the fan blades which was spot welded in 1901 (*Ibid.*, p. 756), and a copy of his letter in reply, dated February 1, 1913, announcing the sending of the fan blade to Mr. McGill, by parcels post (*Ibid.*, p. 756). He also produces a letter from Mr. McGill, dated February 3, 1913, acknowledging receipt of the fan blade (*Ibid.*, p. 757), and another letter from Mr. McGill to the National Electric Welder Company, dated Sept. 2, 1913, stating that he was turning over

the fan blade to Mr. Edwards, the attorney for the Toledo Electric Welder Company, who was conducting defense of the Barney-Berry suit (*Ibid.*, p. 762), also a letter from Mr. McBerty to Edwards, Sager & Wooster, dated January 20, 1917, calling for the return of the fan blades (*Ibid.*, p. 757), and the reply of Messrs. Edwards, Sager & Wooster, acknowledging the receipt of the letter last referred to and stating that the sample blade had been turned over to and had become the property of the plaintiff, the Thomson Spot Welder Company (*Ibid.*, p. 758).

He produced the original welding machine (Defendant's Exhibit B), built in 1901, and explained what parts of it are originals and what reproductions (*Ibid.*, p. 767, *et seq.*, p. 817, *et seq.*) He operated the machine in the presence of His Honor, Judge Killits, at the defendant's plant, in Detroit, producing with it (1) Defendant's Exhibit No. 56, consisting of a complete set of steel fan blades, spot-welded to a steel spider or center; (2) Defendant's Exhibit No. 57, consisting of two steel plates one-sixteenth of an inch thick, spot-welded together at a number of places, constituting a succession of welds, beginning near the middle of the sheets and extending to the edge and then extending inwardly again to the opposite edge (*Ibid.*, p. 769); and (3) another specimen, marked Defendant's Exhibit No. 58, consisting of two plates of one-eighth inch steel stock one and one-half inches wide, spot-welded together in three places (*Ibid.*, p. 769).

He also, with the same machine, produced a number of samples of butt-welded wires, marked, respectively, Defendant's Exhibits Nos. 59, 60 and 61.

During the examination of Mr. McBerty, it was developed that, in the year 1911, the National Electric

Welder Company, of which he was an officer and part owner, was organized to manufacture electric welding machines for both butt and spot welding. Other companies, such as the Winfield Electric Welding Company and the Toledo Electric Welding Co., were at that time engaged in the manufacture and sale of the same kind of machines. After the National Company got started, it was notified by the Thomson Electric Welding Co., the predecessor of the plaintiff, that in the putting out of spot-welding machines, it was infringing upon the Rietzel patent owned by the Thomson Company and also upon the Harmatta patent (Rec., pp. 738 and 745).

The Rietzel patent had been issued on July 20, 1909; the Harmatta patent on December 3, 1912, both to the Thomson Company. The formal notice of infringement was received some time in December, 1912; but, before that time, having learned that the Thomson Company had brought suit against other users of spot-welding machines, under the Rietzel patent, Mr. McBerty had consulted with Mr. J. Nota McGill, of Washington, D. C., his patent counsel, as to how his company could best get protection against the claims of the Thomson Company by reason of his prior work in 1901.

Mr. McBerty showed Mr. McGill the specimen of spot-welding produced by him in 1901 and the welding machine by which the work was done at that time, and the question was canvassed as to how safe it would be to submit the original specimen to the Thomson Company if negotiations looking to immunity from suit were opened up with the Thomson Company (*Ibid.*, p. 739); and the suggestion was made by Mr. McGill that the specimen should be cut in two and a part only used in the negotiations, the identified part

or section (Defendant's Exhibit M, bearing the date 15-2-01) being retained in Mr. McBerty's custody (*Ibid.*, p. 739). This interview with Mr. McGill occurred at Warren, Ohio. Mr. McGill did not take away any part of the specimen with him at that time, but, having meantime arranged for a meeting with Mr. F. P. Fish, counsel for the Thomson Company, he on January 29, 1913, wrote to the National Company to send him a specimen of the welding, saying (*Ibid.*, p. 931):

> "I have asked Mr. Fish to designate some day next week when I may see him in New York.
>
> Please send me one of the fan blades which was spot-welded in 1901, or thereabouts. I mean one of the two which Mr. McBerty showed me when last in Warren. Let him mark it in some way so that he can hereafter identify it when returned."

To this letter, the National Company, through its assistant secretary, replied, under date of February 1, 1913 (*Ibid.*, p. 756):

> "Re your letter of January 29, 1913. We forwarded you today, by parcel post (registered) the fan blade which was spot-welded in 1901 or thereabouts.
>
> We could not give this more prompt attention due to the fact that Mr. McBerty was out of the city, and the writer could not get into the box in which he keeps his valuables."

The specimen blade that was thus forwarded, Mr. McBerty says was stamped by him, before forwarding, in accordance with Mr. McGill's suggestion, with the same private stamp punch "F. McBerty" that had been previously used to stamp Exhibit M (*Ibid.*, pp. 763-764).

The receipt of the blade was acknowledged by Mr. McGill in a letter dated February 3, 1913, which says (*Ibid.*, p. 757):

> "I have your letter of the 1st instant and also the blade welded in 1901. Mr. Fish advises me that he may be able to make an appointment for some day next week."

Mr. McBerty says an interview at Boston with Mr. Fish and others connected with the Thomson Company, was arranged at which he (McBerty) was present and that, on that occasion, he showed Mr. Fish the other cut-off portion of Exhibit M, though he did not leave it with him.

Mr. McBerty further says that after hearing his story, Mr. Fish told him he thought his early work only amounted to an abandoned experiment, and that he (McBerty) then returned the sample to Mr. McGill, who later turned it over to Mr. Edwards, the attorney for the Toledo Electric Co. That the specimen blade was turned over to Mr. Edwards is shown by a letter from Mr. McGill to the National Co., dated September 5, 1913, which says (*Ibid.*, p. 762):

> "I have had an extended interview with Mr. Edwards, the attorney for the Toledo Company, and have turned over to him the several notes of introduction of use witnesses and copies of their affidavits *and the specimen fan blade.*"

Receipt of this fan blade was acknowledged by Mr. Edwards in a letter to Mr. McBerty, dated September 20, 1913, stating (*Ibid.*, p. 763):

> "We have received from Mr. McGill the *data* regarding the early use of spot-welding by the

Warren Company. We would like to send Mr. Howe, of this office, to interview yourself and the other witnesses of this use in order to put the matter in the shape of affidavits, and also to investigate any collateral evidence that might be developed in order to corroborate the various witnesses.'"*

Mr. McBerty testifies that in January, 1917, before the commencement of this suit, he wrote Mr. Edwards for the return of the sample fan blade, to which letter he received a reply reading as follows (*Ibid.*, p. 758):

"Dear Sir:

"Replying to your letter of inquiry regarding the sample of fan blade and affidavit, we beg to say that we examined this matter very carefully at the time it was presented and did not press the point of the exclusion of the evidence by Judge Dodge because, in our opinion, it would have been ineffective against the Harmatta patent. We considered that it would have been regarded by the court as an abandoned experiment. We understand that the National Electric Welding Company, as well as practically all other makers of welding machinery in the United States, is now licensed under the Harmatta patent, and, in view of the fact that the preparation of the affidavit was entirely paid for by the Toledo Company, and in view of the fact that the assets of the To-

*Among these data Mr. Edwards, when called by the plaintiff, admits was the sample fan blade delivered to him by Mr. McGill (Rec., p. 291).

Mr. Howe, plaintiff's witness, does not say that any of the samples annexed to the McBerty affidavit produced by him is the sample fan blade left with Mr. Edwards by Mr. McGill, nor that any of those samples were turned over to him by Mr. Edwards. Mr. McBerty, however, testifies positively that the sample delivered by him to Mr. McGill is not among the samples annexed to the affidavit (Rec., p. 886, Re-D. Q. 1209). The conclusion to be drawn, therefore, is that the missing sample which fits the sample of blade and center (Exhibit M) produced in evidence by Mr. McBerty, is still in plaintiff's possession and has been withheld. (*Ibid.*, p. 758.)

ledo Company have been transferred to the Thomson Spot Welder Company, the affidavit and sample are now the property of the Thomson Spot Welder Company and cannot be delivered without an order from that company. Will you, therefore, take the matter up directly with the Thomson Company?

Yours very truly,

EDWARDS, SAGER & RICHMOND."

From all this evidence it is clear that the missing mating-piece that was cut from Exhibit M is still in the possession of the plaintiff, and that its production in evidence has probably been withheld because of the corroboration it would afford of Mr. McBerty's story in regard to the matter.

Major Edward B. Craft

Major Craft is an electrical engineer. At the time of giving his testimony in this case he was assistant chief engineer of the Western Electric Company, in New York City, with about two thousand (2,000) engineers under him (Rec., p. 773), and had recently returned from war work abroad in the Radio Department of the United States Navy, having been over there on the staff of Admiral Sims.

He was employed by the Warren Electric & Specialty Company, at Warren, off and on, between 1898 and until the first of 1902 (*Ibid.*, p. 774). He went with the Western Electric Company, January 6, 1902, and has been with that company ever since.

He testifies that he got his first experience in electric welding at a visit made to the works of the Pneumatic Wheel Company, Freehold, New Jersey, which Company had purchased of the Warren Electric & Specialty Co., a welding transformer (*Ibid.*, p. 774). Says

that in the latter part of 1900, when the Warren Company was considering the development of a cheap fan with parts of steel instead of brass, the conclusion was reached by him and McBerty of the possibility of utilizing electric welding in the production of the new fan. Accordingly, a rather crude welder was built adapted primarily to the butt-welding of the ends of the steel guard wires of the fan. This welder worked successfully for that purpose (p. 775). He says Mr. McBerty at that time also spot welded some of the steel fan blades of that fan to the steel spiders. He did not actually see Mr. McBerty do this spot welding work, though he remembers that McBerty showed him some of the spot welded fans and satisfactorily demonstrated the strength of the union between fan blades and spiders to him (p. 775). He saw incomplete and wholly completed fans with spot welded blades at that time (p. 775) and saw the fans in operation, running (p. 790). The spot welds served the place of rivets (p. 776). The steel spiders employed were of regular stock and perforated, but the blades welded to them were unperforated (p. 776). For the spot welding of the fan blades pointed copper electrodes were provided (p. 777). He saw the McBerty machine when demonstrated to Judge Killits at the Ford plant and identified it (p. 777). The spot welded work done on this occasion was similar to that seen by him in 1901 (p. 778). He doesn't remember the exact number of completed spot welded fans that he saw at Warren in 1901, but thinks there were at least half a dozen (p. 780). Some of the spot welded fans that he saw were ready to ship (p. 790).

He remembers personally trying to weld fan guards, but doesn't recall trying to weld anything else (p. 792).

The testimony of Major Craft is important because of his standing and his entire disinterestedness.

Jasper W. Powers

Mr. Powers is now in charge of tools and production at the great machine shop of the Babcock & Wilcox Company, at Barberton, Ohio. (Rec., p. 873.)

He was engaged as a machinist and toolmaker at the works of the Warren Electric & Specialty Company between 1898 and some time in 1902, when he went with the Peerless Electric Company and worked in the same capacity till May, 1903 (p. 873).

While with the Warren Electric & Specialty Co., he, under the instruction of Mr. McBerty, built an electric welder for the welding of the iron guards of a cheap fan they were then getting up. This was in the early months of 1901 (p. 874). He identifies the welder, Defendant's Exhibit B, McBerty Machine, and points out parts he remembers working on (p. 874); says he himself operated the welder and welded on it a set of rings which he sent to his brother, who was a magician "doing magic work" at the Pan-American Exposition, at Buffalo, in 1901; that he filed up this set of rings and had them nickel-plated for use at the Exposition (p. 875).

He sent the rings to his brother in April or May, 1901, and himself attended the exposition in July, 1901. He remembers his brother saying, when about to give a performance, "Gentlemen, you will closely observe these rings are not made in a blacksmith shop; these are electric welded" (p. 875).

He testifies he also saw spot welding done on the McBerty welding machine (p. 875). He doesn't recall seeing completed spot welded fans, but remembers

seeing pieces of fan blade stock and pieces of transformer iron spot-welded together and that the welds were good and strong and could not be broken (p. 876). The welds served the place of rivets (p. 876).

Mr. Powers gives his recollection of the reason why spot welding was not generally adopted for the production of the cheap fans, as follows (p. 877):

> "Q. 52. Do you know why the spot welding was not adopted as a general manufacturing proposition for this cheap fan?
>
> A. Not entirely, no.
>
> Q. Tell the Court what, if anything, you know about that.
>
> A. Your honor, I had built up and made a complete line of tools for riveting blades, for riveting spiders, and the men were trained for doing the work in that way; and while I was responsible for the production, for whatever fans we built, that is, the mechanical work on whatever fans were built, I rather argued in favor of continuing the riveting. The season was coming on, as I remember, and we had everything required to continue the manufacture of fans, or proceed with the manufacture of fans, by riveting.
>
> Q. 54. You mean that you argued; with whom did you argue about that?
>
> A. Our manager, Mr. Gillmer, and Mr. McBerty, who, as I remember, rather favored, did favor, welding of the iron blades to the spiders.
>
> Q. 55. Then, at that time Mr. McBerty spot welded the blades to the spiders, you and Mr. Gilmer and Mr. McBerty discussed its regular manufacture by the company?
>
> A. Yes, sir.
>
> Q. 56. And you objected to it for the reasons you stated?
>
> A. Yes, sir.
>
> Q. 57. And they favored it?

A. Well, Mr. Gillmer did, and we proceeded to make them that way, by riveting.

Q. 58. How were the rivets headed up, at that time, by hand or machine.

A. They were what we called hand riveted."

Mr. Powers says the only spot welding machine he ever saw was that made and used by Mr. McBerty in 1901 (p. 878). On his recall (*Ibid.*, p. 982) Mr. Powers says he made the electrodes that were used by Mr. McBerty for spot welding; that they were of hard drawn copper wire and had pointed or conical ends, and that they were made before the conference between Mr. McBerty, Mr. Gillmer, and himself, when the subject of using spot welding as a manufacturing process, for the season, was discussed (p. 982).

John S. Gilder

Mr. Gilder went to work for the Warren Electric & Specialty Company in 1900, and worked in the fan department (Rec., p. 902). He says that at that time the fan blades put out by the company were made of brass and the spiders of bronze; that in 1901 pressed steel blades, iron spiders and steel guards were employed in the construction of cheap fans known as G' and G² fans (pp. 902-903). The fan guards or rings of these fans were welded by an electric welding machine, which he himself at times operated (p. 903). He identifies the machine, Defendant's Exhibit B, as the one used by him in 1901 (p. 903). Says he saw some fan blades for this cheap steel bladed fan that had been electrically welded to their hubs or spiders. Does not know how many, but a tray full containing eight or ten or a dozen. Examined these fan blades and saw they were spot welded;

the welds taking the place of rivets (p. 904). He didn't see any one do the spot welding. The advent of the electric welder caused a good deal of talk among the shop hands. This welding of the fan blades was done the first year the cheap steel fans were made (p. 905).

Evrah C. Lipps

Mr. Lipps is at present foreman of the tool room of the Packard Motor Car Company, at Detroit, Michigan (Rec., p. 916). He was employed by the Warren Electric & Specialty Company, in 1900 and 1901, leaving such employment in June, 1901 (p. 916). He remembers an electric welding machine that was used in the Warren Company's shops in 1901. He occasionally used it himself to butt-weld rings together, though that was not his regular duty (p. 916). He remembers that other things were welded on the welding machine (p. 916). Knows that steel fan blades were welded to the center member (p. 917). He doesn't recollect seeing the actual welding of these fan blades, but recalls seeing them after they were welded (p. 917). On being shown the old welder he identified it as the machine he saw in the factory of the Warren Electric & Specialty Manufacturing Company, before he left there in June, 1901 (p. 917).

The fan blades that he saw were completed fan blades (p. 917). He assisted in making the welder (p. 918). Others who participated in that work were Mr. McBerty and Jasper Powers (p. 918). He remembers that Mr. E. B. Craft was at the factory of the Warren Company while he was there (p. 924). He recalls that bent electrodes were at one time used in the machine (p. 923).*

*NOTE: To this day bent electrodes are sometimes used for spot welding where the work cannot well be passed between the electrode holders. (See Electric Welding, by Hamilton and Oldberg, p. 103.)

On cross-examination, Mr. Lipps was shown an affidavit executed by him in 1913, for use in the Barney-Berry suit, and he testified that the facts set forth in that affidavit were true, according to his recollection at the time the affidavit was made. The affidavit will be found printed in full in the record (Rec., p. 450).

Mr. Lipps was forty-five years old when he made the affidavit and fifty-one when he gave his testimony in this case. Attached to his affidavit and marked "Exhibit "H" are two thin metal plates or sheets that were spot welded together by him in 1901. He had not seen these plates since he gave his affidavit, but was able to identify them (Rec., p. 922). Up to the time of giving the affidavit this spot-welded work had remained continuously in his possession (Rec., p. 453).

In the affidavit, he said that in 1901, at the factory of the Warren Electric & Specialty Company, he saw steel fan blades welded to the steel hub arms in a number of distinct spots and saw others that had been previously so welded. He also said that, so far as he knew, the spot welding of fan blades to the centers was not adopted commercially (Rec., p. 454). In his affidavit, Mr. Lipps refers to the affidavit of Mr. Frank G. Brown (*Ibid.*, p. 478) and to the specimen of spot-welded work attached thereto, marked "Exhibit B," consisting of a fan blade spot-welded to a spider arm and identifies that specimen as identical with what he saw in 1901, if it is not indeed one of the very things he saw (*Ibid.*, p. 454). The Court is asked to read the whole of the Lipps affidavit and also that of Frank G. Brown (*Ibid.*, p. 478). Brown, being dead, could not be examined.

John A. McDonald

Mr. McDonald is at present employed by the Trumbull Public Service Company, at Warren, Ohio, in

electrical construction work (Rec., p. 878). He testifies that from 1898 to 1911 he worked first for the Warren Electric & Specialty Company and then for the Peerless Electric Company.

When he went with the Warren Electric & Specialty Company, all the fan blades and spiders put out by the company were made of brass (p. 879). At first the centers or spiders were provided with three rivets; afterwards with two rivets (p. 879). The fans were, at first, made all of brass and then, for the construction of a cheap fan, they were made of steel (p. 879). The guards of the cheap fans were made of iron and their ends were welded together in an electric welding machine (p. 879). He saw some of this work done and did some himself (p. 880).

First saw the welding machine in the early spring of 1901—February or March (p. 880).

The cheap fan was known as the G^2 fan—G^2 and G^1 (p. 879). He was shown and identified the company's catalogue for 1901 (p. 881). He saw Mr. McBerty spot weld a set of fan blades complete (pp. 880-881). He tested the spot-welded fans (p. 881). There were about a dozen of them (p. 881). He describes the process of testing (p. 881). Says he used one of the spot-welded fans as a test blade for some time (p. 882). The spot welds on the fans served the place of rivets (p. 882). All of the fans survived the test. In none did the blades come loose and none came back after inspection by him (p. 882). Was shown the McBerty machine and identified it as practically the same machine as the one made and used in 1901 (p. 883). He says he never personally did any spot welding on the machine (p. 883).

Captain William E. Smith

At the time of giving his testimony, Captain Smith was a captain of Engineers, United States Reserves (Rec., p. 493). His electrical education began when he was employed by the Warren Electric & Specialty Company, in January, 1900 (p. 493). He was employed as an armature winder, but did other work in the fan motor department of the company (p. 495). Brass was used for the manufacture of the fan blades for the season of 1900, but previous to the beginning of the manufacturing season of 1901 a cheap fan was built in which the blades, spiders and guards were constructed of steel (p. 494). Mr. McBerty designed this cheap fan (p. 495).

Witness saw the electric welder that was installed in the fan motor department of the factory, in 1901. This welder was set up to weld the ends of the steel guard rings (p. 495), but it was also used for spot welding steel fan blades to their steel spiders and he saw it so used (p. 495).

Three spot welds were made between each fan blade and spider (p. 496). Some of the blades and spiders were thus welded in January, 1901, soon after the machine was first set up (p. 496).

He saw at least a dozen complete fans in which the fan blades and spiders were spot welded as described (p. 496). The spot welds served the place of rivets (p. 496). He, himself, operated the welder to unite by butt welding the ends of rings or fan guards and by spot welding pieces of steel such as scrap fan blades and other pieces of steel (p. 496). He examined and operated the machine frequently during the fan season of 1901, possibly a hundred times—usually during the lunch hour, that being the time when the machine was not being used by the regular operator (p. 497).

It was the first electric welder he had ever seen (p. 497). He made tests of the strength of the welds and found that the metal would tear out before the welds would yield (p. 500). Upon being shown the welder, Defendant's Exhibit B, he identified it as the machine used by him in 1901. Produces photographs of the welder as now assembled (pp. 500-501) and produces samples of welded work made by him on such machine about a year before his examination (p. 499). He identifies the cuts in the 1901 catalogue, designated G^1 G^2 as cuts of the cheap steel-bladed fan referred to (p. 499).

He says when the welder was used in 1901, no secrecy attended its use; it was used openly and any onlooker who came to the factory could see it (p. 502). It was examined by many employees during the lunch hour and its performance as a spot welder was witnessed by them (p. 502).

Witness left the employ of the Warren Electric & Specialty Co., when its fan motor and transformer business was taken over by the Peerless Electric Company in 1902. He then went with the Peerless Company and remained there till January 1, 1905 (p. 503).

After leaving the Peerless Electric Company he went to the Ohio Works of the Carnegie Steel Company, at Youngstown, Ohio, and between February and June, 1905, while at the Carnegie Works, he built for that company an electric welder which was used for uniting pieces of half-inch rod, also for welding overlapping steel plates and for welding together overlapped pieces of resistance ribbon, face to face (pp. 503-504). He produces a blue-print of the welder so built by him for the Carnegie Company and describes the construction of the welder and its manner of use (p. 504). The welding done by the machine was spot welding. He was asked (p. 504):

"Q. 138. Where did you obtain the knowledge from which you were able to make your machine to weld in spots, as you have stated?

A. From work that I had seen done and had done myself on the machine made by F. P. McBerty at the Warren Electric & Specialty Company Factory."

On cross-examination, Mr. Smith testified that the Peerless Electric Company took over the fan motor department of the Warren Electric & Specialty Company about July 1, 1902, and that the welder went with the other effects turned over, but that he never operated the welder after this change, it being placed in a different part of the building from that in which he worked (p. 512).

He named as those who operated the welder in 1901, John Gilder, Curtis Brewer and Charles Elliss (p. 519) and named Mr. McBerty and Mr. Lipps as persons whom he remembered to have seen operating the machine (p. 520).

McElray

Mr. McElray is Assistant Chief Superintendent of the Carnegie Steel Company, of Youngstown, Ohio (Rec., p. 908). His testimony is corroborative of the testimony of Captain W. E. Smith, as to the latter's work in the building of spot welding machines at the Carnegie Company's Works in 1905, pursuant to information derived from Mr. McBerty and the latter's welder in 1901.

Mr. McElray says that he helped Mr. Smith build his welder, identifies the blue-print of the machine, Defendant's Exhibit G. Smith Welder, produced by Mr. Smith (*Ibid.*, p. 910). He further says that resistance ribbons, like samples produced, marked Defendant's Exhibit 71, Illustrating Work Done on

Smith Electric Welder were spot welded on this Smith machine in 1905 and the product resulting was put into commercial use in that year (*Ibid.*, p. 911).

Albertus C. Taylor

Mr. Taylor is at present the Vice-President and General Manager of the Taylor Welder Co., of Warren, Ohio.

Says he first saw an electric welder in May, 1903, at the factory of the Peerless Electric Company, Warren, Ohio (Rec., p. 892). It was the McBerty Welder, Defendant's Exhibit B (*Ibid.*, p. 893). Says he used the machine at the Peerless factory for making butt welds, for welding crossed wires and for welding flat sheets face to face (*Ibid.*, p. 893). He did not use pointed electrodes in the welding of the plates, face to face, but clamped the plates between the copper holding dies themselves to get the pressure on the plates, and then passed current through the dies and plates to produce the weld (*Ibid.*, p. 895). This, of course, was spot welding.

He left the Peerless Company, in 1904 (*Ibid.*, p. 895), and went with the Winfield Electric Welding Company, where from knowledge obtained of the McBerty welder at the Peerless Company, he built, in 1904 (*Ibid.*, p. 895) a spot welder for spot welding metallic white lead kegs and stove pipe elbows.

He also from knowledge of McBerty's work, built spot-welders for the market, in 1906 and 1907, but none were sold till 1908 (*Ibid.*, p. 898), there being difficulty in introducing them, because of distrust of the efficacy of spot welding in those early days.

The spot welders put out by the Winfield Company were the first spot welders ever put on the market by anyone, to the witness' knowledge (*Ibid.*, p. 899).

Mr. Taylor produced sketches illustrating the various welding machines built by him and samples of work illustrating the various applications of spot welding done on these machines.

Mr. Taylor's testimony is of importance because it shows that he, like Capt. W. E. Smith, got his knowledge of the principles of spot welding and of the practical application of those principles from the work of Mr. McBerty and from that knowledge was able to go off and build practical spot welding machines—the first to appear upon the market in this country.

Mr. Taylor, like Capt. Smith, "carried on."

Fred G. Carter

Mr. Carter is a machinist now employed at the factory of The Trumbull Steel Company, of Warren, Ohio (Rec., p. 913).

He worked for the Winfield Company in 1904-1905 at the time Mr. Taylor was employed by that company. He remembers the electric welder built by Mr. Taylor, identifies the machine illustrated in the drawing produced by Mr. Taylor (Defendant's Exhibit 69) and recalls the spot welding of strips of sheet steel and of the steel parts of pipe elbows (*Ibid.*, p. 914) by means of that machine.

He himself operated the machine to spot weld.

Other spot welding machines were built at the Winfield factory before he left there in 1907 (*Ibid.*, p. 915) and the product of these machines—stove pipe elbows—was marketed (*Ibid.*, p. 915).

William B. Ensor

Mr. Ensor is in the service department of the Peerless Electric Company, at Warren, Ohio. He testifies

that he began working for the Peerless Company in January, 1911 (Rec., p. 954); that soon after he went to work there he found among a collection of old fans and parts in the old stock house, a fan of the Warren Electric & Specialty Company's manufacture, which had a *rivetless* blade.

He was asked (*Ibid.*, p. 955):

> "Q. 9. Are you sure that the blade referred to by you was a *rivetless* blade?
>
> A. Oh, yes. No question about it. The blade was a black Japan blade and was perfectly smooth. My attention would not have been called to it if it had rivets in it.
>
> Q. 10. Where in the factory did you see the fan with the rivetless blade?
>
> A. It was on the rack of repairs and returned stuff. This returned goods was in what we now know as the stock room. There was a rack there on which returned goods were put that might be useful for repairs at some future date. These old fans are pretty valuable to us to get repair parts from.
>
> * * * * *
>
> Q. 17. What became of the fan or the rivetless blade, if you know?
>
> A. I don't know, it just disappeared."

It appears from Mr. Ensor's testimony that Newton Smith (an emissary of the plaintiff) had been at the Peerless factory looking for old fans and that witness told him about the old rivetless fan he had seen (p. 956).

It is, of course, only an inference that Newton Smith may have found the rivetless fan in question, and, in some way, have caused it to disappear. He would not be above doing a thing of that sort. It is proven that he is a spy, in the service of the plaintiff, and that, un-

der false representations, he obtained employment as shop superintendent of Mr. McBerty's company, The National Electric Welder Company, and was caught investigating the letters and records of that company, with which he had no business, and, on one occasion, surreptitiously opened the company's safe (Mrs. McBerty, Rec., pp. 976-977; F. P. McBerty, *Ibid.*, p. 889, *et seq.*).

John B. Estabrook

That the property and stock, including fan motors and fans, of the Warren Electric & Specialty Company, was purchased and taken over by The Peerless Electric Company, in the summer of 1902, is established by the records of the Peerless Company and by the testimony of Mr. John B. Estabrook, the Secretary of the company (Rec., pp. 671-672). This tends to corroborate the story of Mr. Ensor that the rivetless fan of the manufacture of the Warren Electric & Specialty Company was by him, as he testified, found in the old stock house of the Peerless Company and disappeared after Newton A. Smith had been informed of the fact.

Plaintiff's Unsuccessful Attempts to Answer the McBerty Defense

1. Although knowledge was brought home to counsel for the defendant, in the Barney-Berry case, that Mr. McBerty built and used an electric welding machine in 1901 and did spot welding on it, in that year, not only was the McBerty defense not exploited in that case, but a studied effort seems to have been made to spoil and exclude it, so that it should not be fully available to any one else in any subsequent suit brought on the Harmatta patent.

It appears that, in the fall of 1913, Mr. Clifton V. Edwards, of the firm of Edwards, Sager & Wooster, of New York City, counsel for defendant in the Barney-Berry case, sent one of his assistants, Mr. Thomas Howe, out to Warren, Ohio, to interview Mr. McBerty in regard to his early work in electric welding.

Mr. Howe saw Mr. McBerty and the latter put him in communication with a number of available persons whom Mr. McBerty thought would remember about his work and be willing to give corroborative evidence in regard to it.

Mr. Howe at that time took the affidavits of Mr. McBerty and of quite a number of other persons and secured and annexed to the affidavits specimens of spot-welding identified as having been made on the McBerty welder in the year 1901. Two of these specimens were attached to the affidavit of Mr. McBerty and another to the affidavit of Mr. Lipps, the specimen last referred to having been in Mr. Lipps' possession ever since it was made in 1901. During the cross-examination of Mr. McBerty in this case before Judge Killits these affidavits were produced and offered in evidence by the plaintiff.

Plaintiff now attempts to meet the McBerty defense by contending that, because the defense appears to be better established by the testimony offered in 1919 than it does by the affidavits procured by Mr. Howe, in 1913, the proper deduction to be made is that the additional evidence has been manufactured out of whole cloth for the purposes of this case.

We reply to this, that the testimony and the affidavits agree, in all essential particulars, as to the fact of the building of the welding machine and its use, in 1901, both for butt welding and for spot welding, as well as to its use for the spot welding of steel fan

blades to steel spiders or centers, and the present testimony merely establishes, in addition, a commercial use, on a very small scale, of the spot welded product. It is significant that the affidavits do not state that there was no commercial use.

Mr. McBerty testifies that he did tell his whole story to Mr. Howe before the affidavits were prepared, stating to him that a number of spot-welded fans were completed and went to the trade, and joining him in a search for such fans at the Peerless factory (Rec., pp. 960-961), but that Mr. Howe sought to confine the affidavits to the specimens of spot welding that had been actually preserved and were in hand.

His testimony on the last point is as follows (Rec., p. 966):

> "Q. 58. Mr. Howe, in answer to Q. 11, gives the impression that you never told him of making more than one complete fan blade; and didn't tell him any spot welded blades were assembled in complete desk fans that went out to the trade. Have you anything to say about this?
>
> A. Mr. Howe's memory, in connection with this matter, is not good; as that was gone over very thoroughly, in detail, the prior work that had been done on spot welded blades. And his final judgment was, we should confine our testimony in reference to this spot welding on actual samples we had on hand."

When Mr. McBerty gave his affidavit in 1913, he did not have the 1901 catalogue before him with which to refresh his collection, nor did he have the benefit of a conference with his principal corroborating witnesses, Major E. B. Craft and Captain William E. Smith, who have given such conclusive testimony, in

the presence of the trial court, in this case, and it is not, therefore, at all surprising that his present testimony not only corroborates, but to some extent, supplements, the statements made in the affidavits, without being in conflict therewith.

Another thing must be taken into consideration—Mr. McBerty had been advised, both by his counsel, Mr. McGill (Rec., p. 739), and by his friend, Mr. White (*Ibid.*, p. 888),.that it would be dangerous to part with evidence of his early work, as he might never see it again, and he testifies that he did, in fact, hold back and never parted with, to any one, the dated specimen, Defendant's Exhibit M. The wisdom of his having done this is shown by his failure, to this day, to recover the counterpart of Exhibit M, which was delivered into Mr. Edwards' hands, and by the latter, turned over to the plaintiff.

In weighing the statements of the affidavits, the court will give them more or less probative force, accordingly, as it conceives they were prepared by Mr. Howe with the intention of establishing or of *spoiling* the McBerty defense.

It is certain that the affidavits, as they stand, show, beyond question, the fact of the actual practice of spot welding, repeatedly, by Mr. McBerty in 1901, and, that they, taken in connection with the specimens of work actually produced and annexed to the affidavits, fully justified the setting up of the defense in the answer in the Barney-Berry suit, and the calling of witnesses, when that case was tried, to prove that defense. The fact that Mr. McBerty was put upon the stand in that suit, and was then not allowed to tell his story, simply because his priority had not been technically pleaded in the defendant's answer, looks very much like a deliberate and concerted attempt to spoil the defense,

for all time. Both counsel for the plaintiff and counsel for the defendant were aware of Mr. McBerty's claim to priority, and of the available evidence to support it before that suit was tried.

Once we get the notion that the Barney-Berry suit was not fully defended, but, by preconcert, was fought softly, to say the least, we can well understand how the affidavits taken by Mr. Howe may have been artfully framed to satisfy Mr. McBerty and yet lend color to the argument of abandoned experiment by a studied failure to include anything looking like the commercial use of spot welding by Mr. McBerty.

2. When Mr. McBerty testified before the court in this case that the 1901 and the 1902 catalogues contained illustrations of the "ironclad" G-2 fan, and told the court that such illustrations were made from a photograph of one of the actual spot welded fans, and pointed out that, whereas, in all the other illustrations of fans to be found in those catalogues, the rivets employed to connect the fan blades to their spiders were shown, and further identified the cut in the "American Electrician" of March, 1901, as illustrating also the spot welded G-2 fan,—plaintiff felt the force of the blow and set about to try to discredit the illustrations.

To that end, plaintiff called a photographer, Mr. Wilbur F. Turner (Rec., p. 306), who testified that it would be easy to photograph a fan whose blades had been riveted, and then prepare the negative so that the rivets would not show in a positive printed from the negative, and that, in his judgment, was precisely what had been done to the negative taken of the G-2 fan, the photographer having failed to put back the rivets in the negative, as had been done, it was claimed, in the case of the other photographic illustrations shown in the catalogues!

Of course, nobody ever doubted that a photographic negative could be so manipulated as to not truly represent the object photographed; but it is certainly a strain upon one's credulity to believe that this particular kind of alteration was made, back in 1901, on the negative of this particular critical, G-2 fan, whose identity, as a rivetless fan is so well established by evidence outside the photograph.

We think the court will accept the straightforward testimony of Mr. McBerty and his witnesses to the fact that the fan was a rivetless fan and that the illustration correctly portrays it, rather than the expert testimony of this willing photographer, procured to testify eighteen years after the event to meet a serious exigency.

3. Another attack made upon Mr. McBerty's evidence was made through the deposition of Mr. Richard L. Binder, of Philadelphia, and through Mr. James H. Gravell plaintiff's stop-gap, in the latter's fifth and sixth depositions.

Mr. Gravell, in his fifth deposition (Rec., p. 361) took great satisfaction in pointing out that the specimen of fan blade and spider, Defendant's Exhibit M, introduced by Mr. McBerty as a specimen of spot welding done by him in 1901, showed two (2) rivet holes and that illustrations of fans having two (2) rivets were not to be found in any of the catalogues or trade illustrations of Peerless fans until the year 1909, and that in the issue of the "Electrical World" of March 4, 1909, the blades of the Peerless fans were first shown as having been attached by two (2) rivets each. The deduction, of course, sought to be drawn from all this was that Defendant's Exhibit M, and all other specimens produced by Mr. McBerty that

showed a two-rivet connection, were faked and were really made from parts first used in the manufacture of the Peerless fans in 1909.

In an attempt to make this point stronger, Mr. Gravell, in his sixth deposition (Rec., p. 382) testified that he had found at the J. B. Shannon Hardware Company's store, in Philadelphia, an old fan (Plaintiff's Exhibit 51, Fan Purchased by Gravell), corresponding as to base, standard and other parts to the G fans illustrated in the 1901-1902 catalogues, and Mr. Binder, in his testimony, attempted to identify this fan as a sample of the cheap fan like those put out by the Warren Electric & Specialty Company, somewhere around 1901-1902 (Rec., p. 385), which had the blades and spider arms attached by three rivets, instead of by two rivets, the spider being a cast brass spider and the blades being of steel (*Ibid.*, p. 383). This was supposed to be further proof that the Warren Electric & Specialty Company had never made any two rivet fan blade connections, especially two-rivet connections for uniting steel blades to steel spiders, as early as 1901.

But this latest attempt to discredit the testimony of Mr. McBerty and his corroborating witnesses was completely annihilated by defendant's proving, on rebuttal, from the records of the Peerless Electric Company, the successor of the Warren Electric & Specialty Company, that, for the season of 1901, the Warren Electric & Specialty Company issued and sent out to the trade four separate printed illustrated bulletins, namely,—

(a) Bulletin No. 1, illustrating fan A-2 having cast brass center and three (3) rivets per blade;

(b) Bulletin No. 2, illustrating fan A-6, showing stamped steel center and two (2) rivets per blade;

(c) Bulletin No. 3, illustrating fan E-2 having cast brass center and three (3) rivets per blade; and

(d) Bulletin No. 4, illustrating fan G-2 with stamped steel center and blades spot welded thereto, the illustration of this last bulletin being like the illustration of the G-2 fan in the catalogue of 1901 and 1902, and showing a rivetless fan.

Mr. McBerty testified to the character of the fan blades and spiders shown in these several exhibits (Rec., p. 1010), and Mr. George B. Sawyer, of the Peerless Electric Company, testified (*Ibid.*, p. 1007) that the scrap book containing the exhibit bulletins referred to by Mr. McBerty was produced from the archives of the Peerless Company and was a book with which he was familiar while he was employed by the Warren Electric & Specialty Company during the years 1901-2.

Mr. McBerty further testified that the spider and fan blades on Plaintiff's Exhibit No. 51 were not on the fan as originally put out, but represent some vagrant spider and blades that had been attached to the shaft of the fan at some later period, and that the rivets shown on the blades of the exhibit are machine headed, whereas the Warren Electric & Specialty Co. had no riveting machine in 1901-2 (Rec., p. 1013). He further testifies that the shafts of various desk fans are of the same diameter and are so built to accommodate any fan spider. It appears, therefore, that these attacks of the plaintiff upon the integrity of the testimony of Mr. McBerty and his witnesses in regard to the G-2 fans have reacted upon the plaintiff and have had the effect of materially strengthening the defendant's case.

On the whole, the evidence is satisfactory and con-

clusive (1) that there was practiced the method and (2) that there was made the product of the Harmatta patent, by Mr. McBerty, in the year 1901.

The practice of the method could, of course, only be proved by the testimony of those who practiced it or saw it practiced. Such proof has been adduced. The machine by which the method was practiced has been preserved and is in Court and has been fully identified by many witnesses. The spot-welded products or articles resulting from the practice of the method, by means of the machine, are in Court—several samples of them—and their identity has been fully established by witnesses of the highest standing. The defendant could do no more. It has satisfied the requirements in such cases.

The number of times the method was practiced and the number of times the product was produced is quite immaterial. A single, well authenticated instance of the practice of an invention has many times been decided, by highest authority, to be sufficient to defeat a patent.

In Egbert vs. Lippman, 104 U. S., 333, it appears that Barnes, the patentee, made a set of corset steels and presented them to his fiance, who wore them for more than two years prior to the application for his patent. Proof of this fact, invoked the following language from the Court:

> "We observe, in the first place, that to constitute the public use of an invention it is not necessary that more than one of the patented articles should be publicly used. The use of a great number may tend to strengthen the proof, but *one* well defined case of such use is just as effectual to annul the patent as many" (citing cases).

Coffin vs. Ogden, 18 Wallace, 120, is to the same effect. In that case, in a suit for infringement of a lock patent, defendants pleaded the manufacture and use, by one Erbe, of a lock embodying all the attributes of complainants. It was proven that Erbe made but three of such locks, one of which was in evidence; but the proof was convincing as to the fact of his having made *a lock* of the type under discussion. The Court said (p. 124):

> "The invention or discovery relied upon as a defense must have been complete, and capable of producing the result sought to be accomplished; and this must be shown by the defendant. The burden of proof rests upon him, and every reasonable doubt resolved against him. If the thing were embryonic or inchoate; if it rests in speculation or experiment; if the process pursued for its development has failed to reach the point of consummation; it cannot avail to defeat a patent founded upon a discovery or invention which was completed, while in the other case there was only progress, however near the progress may have approximated to the end in view. The law requires not conjecture, but certainty. If the question relate to a machine, the conception must have been clothed in substantial forms which demonstrate at once its practical efficacy and utility. The prior knowledge and use of a *single person* is sufficient.
>
> The number is immaterial."

In Brush vs. Condit, 132 U. S., 39, the Brush patent for improvement in electric lamps was sued upon and the use of a single lamp made by one Hayes for more than two years prior to the application, was set up as a bar. It appears that Hayes made but one lamp, which was used in and about the mill of Wallace &

Sons, in the ordinary way. Justice Blatchford, in expressing the opinion of the Court that this was a sufficient public use, said:

> "The case is that of the public, well known, practical use, in ordinary work, with as much success as was reasonable to expect at that stage in the development of the mechanism belonging to electric arc lighting, of the exact invention which was subsequently made by the patentee, and, although only one clamp and one lamp were ever made, which were used together two and one-half months only, and the invention was then taken from the lamp and was not afterwards used with carbon pencils, it was an anticipation of the patented device under the established rules upon the subject * * *."

The Court of Appeals for the Seventh Circuit held, in U. S. Mineral Wool Co. vs. Manville Covering Co., 125 Fed., 770, that the practice of a process for producing wool, on two separate occasions, and no more, invalidated a patent for such process, though it appeared that no efforts were made to further use the process.

Judge Baker, speaking for the Court, said:

> "If the patent is not void for indefiniteness (citing cases), we think the process was anticipated by the prior use at Joliet. What Pettigrew and Gleason did was not an abandoned experiment. They knew the product they wanted to get. They experimented with hardened slag alone unsuccessfully * * *. The process they discovered in 1884 did not lapse into a lost art. In 1886 they used it in successful manufacture. Why the Illinois Steel Co. did not have them continue is not clear, but they were not the masters. Nevertheless, whenever they have been called upon since 1884 to explain the process they have done

so. The use was not secret. The process was practiced by Pettigrew and Gleason and those who assisted and was open to the observation of the employes generally and of all who passed through the plant. We think there was abundant publicity. Coffin vs. Ogden, 18 Wall., 120; Brush vs. Condit, 132 U. S., 39."

This case was tried in open court and the McBerty defense exploited in the presence of the Judge.

In its opinion the trial court said:
(Rec., pp. 40-41).

"We have seen the witnesses as they spoke on the stand. The naturalness of their stories suggests want of co-operation. They corroborate each other in the varying scopes of their experiences with Exhibit B. Their testimonies are to such important things that, if unreliable in substance, there is no escape but to assign willful perjury as the cause by a number of men whose credibility is not subject to attack from anything that appeared before us.

The testimony of Smith, Craft, Powers, Gilder, McDonald, Taylor and Ensor and Brown (by affidavit) is all perjured—every one of these men, as well as Lipps and McBerty, is foresworn—if this allegation of prior use is substantially untrue. Perjury is unthinkable with such men as these men appear to be. Besides, their stories have in them no element of the unusual or unexpected. What they say McBerty did in 1901 is just what we can see one interested in the matter might readily do in due course of satisfying his interest. The incident was a logical step, plainly indicated in the condition of the prior art."

The conclusiveness of the findings of fact of the trial judge is upheld by the great weight of authority.

We give below citations from opinions of this Court and of the various Circuit Courts of Appeals on the subject:

Supreme Court Cases

"A special finding by the court upon issues of fact, where the parties or their attorneys have duly filed a stipulation, waiving a jury, has the same effect as a verdict, and is not subject to review by this court except as to the sufficiency of the facts found to support the judgment."
Tyng v. Grinnell, 92 U. S., 467.

"Where a case is tried by the Circuit Court without a jury, and it makes a special finding of facts, with conclusions of law, alleged errors of fact are not, on a writ of error, subject to revision by this court, if there was any evidence on which such findings could be made."
Hathaway v. First Nat. Bank, 134 U. S., 494.

"Where a case is tried by the court, a jury having been waived, its findings upon questions of fact are conclusive in the courts of review."
Dooley v. Pease, 180 U. S., 126.

"Under R. S. Secs. 649, 700 and 1011, findings of fact have the same effect as the verdict of a jury, and this court does not revise them but merely determines whether they support the judgment."
U. S. v. Fidelity Co., 236 U. S., 512.

"The rule which gives conclusive effect to a finding made by a judge who saw the witnesses, when there is testimony consistent with it and the finding depends on conflicting testimony or the credibility of witnesses, is peculiarly applicable in a case wherein a patent is assailed by oral evidence of an alleged unpatented anticipation."
Adamson v. Gilliland, 242 U. S., 350.
See also *Wiscart v. D'Anchy*, 3 How., 320.

Circuit Court of Appeals Cases:

FIRST CIRCUIT.

"He (the trial judge) had so much better opportunity than this court to judge correctly the accuracy and credibility of the various witnesses that, on familiar and established principles, his conclusions will not be disturbed unless they are clearly wrong."

Fuller v. Reed, 249 Fed., 158.

SECOND CIRCUIT.

"The testimony is not direct, but is circumstantial, and somewhat conflicting * * *. But on examination of the record it appears that there is credible testimony which supports the findings of the court below * * * and we think that finding is under all circumstances conclusive upon this court on this appeal."

Pierce v. Dock Co., 265 Fed., 148, 153.

"We must, therefore, accord to the findings of fact, in a case tried to the court without a jury, there being a stipulation in writing waiving the jury, the same effect as we would give a verdict."

Nashville Co. v. Barnum, 212 Fed., 634, 639.

"We should not reverse his finding upon a mere pure question of fact, where the evidence justifies the finding, even if we might have reached a different conclusion upon the evidence."

Brookheim v. Greenbaum, 225 Fed., 763, 764.

THIRD CIRCUIT.

"By stipulation a jury was waived and the case tried by the judge. He found a verdict for the plaintiff * * *. Where, as here, a case is tried by a judge, the findings of fact by a court are conclusive, unless there is no evidence to sup-

port them. Hathaway v. First Nat. Bank, 134 U. S., 494."

Washington Co. v. Murray, 211 Fed., 440, 447.

"By stipulation, under R. S. 649, the parties waived trial by jury. The findings of the judge, under the statutory submission, having the effect of a verdict (Lehnan v. Dickson, 148 U. S., 71), the first question arises: Was there competent evidence on which to base the finding that Peet's account was overdrawn?"

Elliott v. Peet, 202 Fed., 434, 436.

FOURTH CIRCUIT.

"Every finding of fact made by the District Court, having reasonable support in the evidence and tending to support the judgment, is binding on this court."

Virginia Co. v. Charles, 254 Fed., 379, 382.

"It is familiar doctrine that the findings of the trial court in an equity case are presumptively correct, and will not be set aside by an appellate tribunal, unless they are based upon an obvious error of law or a serious mistake in dealing with the facts."

McKeithan Co. v. Fidelity Co., 233 Fed., 773, 774.

FIFTH CIRCUIT.

"Where jury was waived and all matters submitted to the judge, his findings on issues of facts are, at least, entitled to as much consideration as a verdict and so will not be disturbed on appeal, if there was evidence furnishing a basis therefor."

Bain v. White, 256 Fed., 428.

"It is settled that an appellate court of the United States does not weigh the evidence."
Barber Co. v. Brown Mach. Co., 258 Fed., 1, 3.

"Counsel seem to overlook the rule that a federal appellate court does not weigh the evidence, though, of course, the court must be satisfied, as we are here, that there is proper evidence which in law is sufficient to support the verdict."
Lake Erie Co. v. Schneider, 257 Fed., 675, 679.

"The entire testimony in the case, except Rich, who did not attend the conference, was taken in open court. There was express testimony supporting the court's conclusion; and this conclusion we are bound to accept, unless the evidence preponderates against it."
Escanaba Co. v. Burns, 257 Fed., 898, 901.

"We are disposed to treat this as a special finding, though, whether general or special, it has the effect of the verdict of a jury. Hence the only inquiries open to this court are * * * whether the evidence tends to support the ultimate findings * * *. This results from the statutes and the decisions, Secs. 649, 700 and 1011, R. S. U. S.; Morris v. Jackson, 76 U. S., 125; Runkle v. Burnham, 153 Fed., 216; U. S. v. U. S. Fidelity Co., 236 U. S., 512; Chicago Co. v. Barrett, 190 Fed., 118 (CCA 6); Mason v. Smith, 191 Fed., 502 (CCA 6)."
Turner v. Schaeffer, 249 Fed., 654, 656.

"Not only must we apply the familiar rule that we will not overturn the fact findings of the trial judge, save in a very clear case * * *."
King v. Weiss Co., 266 Fed., 257, 259.

"Where the trial court has seen and heard the witnesses, we are always reluctant to set aside its finding of fact."

City of Toledo v. Toledo Co., 259 Fed., 450, 453.

"In accordance with our settled practice we must give great weight to the conclusions of the trial judge. If Mr. and Mrs. Snodgrass told the truth in their testimony, the petitioner has no case. Their veracity was the controlling question, and this may be so far judged by their manner and by the atmosphere, which cannot be reproduced in the printed record, that only when 'there is a decided preponderance against the judgment' will an appellate court reverse such a decree. Cleveland v. Chisholm, 90 Fed., 431, 434 (CCA 6); Monongahela v. Schinnerer, 196 Fed., 375 (CCA 6)."

Pugh v. Snodgrass, 209 Fed., 325, 326.

"The trial judge had the advantage of seeing and hearing all the witnesses except the bankrupt; and every experienced lawyer knows what that means. While equal advantage exists here as respects the deposition of the bankrupt, yet this is not so as to the testimony of appellant; the important element of demeanor of the witness, like that of every other witness who testified before the Court is, of course lacking.

Indeed, the rule in such circumstances is not to disturb the judgment of a district court unless it is overborne by the clear weight of the evidence as disclosed by the record (citing cases)."

Carey v. Donohue, 209 Fed., 328, 333.

"Where an action at law is by stipulation tried to the Court without a jury under R. S. U. S., 649 and 700, the findings of fact made by the court are not reviewable by an appellate court, if there is any competent evidence on which they could have been made."

Chautauqua Inst. v. Zimmerman, 233 Fed., 371.

"Findings of fact by the trial judge in an equity case will not be disturbed on appeal, unless the evidence preponderates against them."

Estep v. Kentland Co., 239 Fed., 617.

SEVENTH CIRCUIT.

"As the trial judge saw and heard the witnesses, his findings upon the issues of fact will not be set aside, unless the cold type of the record demonstrates that a material finding was either unsupported by evidence or was made in the face of a clearly ascertainable preponderance to the contrary."

Aetna Co. v. Davidson Co., 257 Fed., 68.

"The court heard the evidence of the witnesses, and had before it the alleged infringing devices * * *. The evidence of the witnesses is contradictory, and in so far as the decree is predicated thereon, we cannot disturb it."

Blettner v. Gill, 251 Fed., 81, 82.

"It is true the weight of this testimony is somewhat shaken by other evidence. * * * But the weight of his testimony was for the District Judge to determine."

Deister Co. v. Deister Mach. Co., 263 Fed., 706, 709.

"The rule is that a finding of the trial court on an issue of fact will not be disturbed on review, unless the finding is clearly against the weight of the evidence."

Winter v. Bostwick, 212 Fed., 884, 887.

"The facts found by the chancellor will be presumed correct, unless the record shows an egregious blunder in the consideration of the evidence, or an error in the application of the law, resulting in manifest injustice" (citing cases).

"The pertinent issue of fact was determined solely upon the testimony of James R. McKay, and counsel urges that the foregoing rule applies only where there is a conflict in the evidence. This is not so. The evidentiary facts may all be made known from the month of a single witness, and yet the ultimate fact as determined by the chancellor is just as persuasive as if the evidentiary facts had come from many witnesses."

Weld v. McKay, 218 Fed., 807, 809.

EIGHTH CIRCUIT.

"Unless we are to completely disregard the rule that the finding and decree of a chancellor, who has heard the witnesses, will not be disturbed, except in a clear case, the decree ought to be affirmed."

Hamlin v. Grogan, 257 Fed., 59, 60.

"It was said in Adamson v. Gilliland, 242 U. S., 350, that a patent case is preeminently one for the application of the practical rule that so far as the finding of the master or judge who saw the witnesses depends upon conflicting testimony, or upon the credibility of witnesses, or so far as there is any testimony consistent with the finding, it must be treated as unassailable."

Fed. Co. v. Pick & Co., 251 Fed., 894.

"On this appeal the controversy is purely one of fact. The questions raised are: First, was the court below wrong in holding that the deed from Barnes to Bates was genuine * * *?

To secure a reversal upon such a basis as that just mentioned the appellant must convince us not only that the trial court may have been wrong, but that it was manifestly wrong. There must, under the holdings of this court, have been an 'obvious error' of law or a 'serious mistake' in dealing with the facts. (Cases cited.) The error

must be 'clear and palpable.' Babcock v. De Mott, 160 Fed., 882. The conclusion of the trial court is presumptively right. Some distinction relieving from this rule is claimed in the present case because the testimony was not taken before the judge but before an examiner, and it is said that under such circumstances this court is in as favorable a situation to deal with the matter as was the court below. U. S. v. Booth Co., 203 Fed., 423 (this circuit) is cited to this point. But the question is not so much one of situation to decide as of where the law places the primary determination of questions of fact. While no doubt the circumstances that the district judge personally heard the witnesses tends to strengthen the presumption in favor of his conclusions—a consideration mentioned by this court in Coder v. McPherson, 152 Fed., 951 and Harper v. Taylor, *supra,* by the Circuit Court of Appeals for the Sixth Circuit in Mt. Vernon Co. v. Wolf Co., 188 Fed., 164,—the fact that he did not hear such witnesses, but that the proofs before him were entirely by deposition or upon examiner's report, does not destroy the presumption. Such still exists in favor of his conclusion. To hold otherwise would be to make this the court of first instance. The District Court is not in such matters a mere conduit. Our functions are simply to guard against manifest error on its part, and this is true whether such arises upon hearing witnesses or upon reading a record."

U. S. v. Marshall, 210 Fed., 595, 597.

"When an action at law is tried without a jury by a federal court, and it makes a general finding, or a special finding of facts, the act of Congress forbids a reversal by the appellate court of that finding, or the judgment thereon, 'for any error of fact' (R. S. U. S., Sec. 1011), and a finding of fact contrary to the weight of the evidence is an error of fact."

Wear v. Imperial Co., 224 Fed., 60, 63.

"The rule is firmly established by the Supreme Court and has been repeatedly applied by this Court: That where the chancellor has considered conflicting testimony, made his findings and decree thereon, they will be held by the appellate courts to be presumptively correct, and unless an obvious error has intervened in the application of the law, or some serious mistake has been made in the consideration of the evidence, the findings must stand." (Cases cited.)

Nichols v. Elken, 225 Fed., 689, 692.

NINTH CIRCUIT.

"The trial court held there was no infringement of the patent in suit.

In such a case, the trial court having the advantage of seeing and especially examining the material which it is claimed infringes, an appellate court, without such advantages, will not disturb the conclusions reached, unless it appears clearly that the finding is against the obvious weight of the testimony."

Diamond Co. v. Webster Bros., 249 Fed., 155 158.

"That conclusion was sustained by direct testimony which the court below credited, and we regard it as binding on this court."

Hathaway v. Ford Motor Co., 264 Fed., 952, 954.

"Allegations of fact made in defense of the action * * * were negatived by the findings of the trial court, and under the well established rule such findings are conclusive upon us, however convincing we might otherwise consider the argument of plaintiff in error that upon the evidence such findings should have been otherwise. Tyng v. Grinnell, 92 U. S., 467; Dooley v. Pease, 180 U. S., 126."

Nat. Surety Co. v. Globe Co., 256 Fed., 601, 602.

"The findings of fact are all based upon evidence which is conflicting, and which was taken in open court, and they will not be disturbed by this court, in the absence of a showing that in arriving at the same, the court below erroneously applied some rule of evidence or found contrary to the decided weight of the testimony."

Leggat v. M'Lure, 234 Fed., 620, 621.

CONCLUSIONS

It is respectfully submitted that a careful examination of the record in this case will justify the Court in reaching the following conclusions, among others:

1. That Johann Harmatta contributed nothing new to the art of electric resistance-welding, but that everything that he disclosed by way of method or of product, was known to and disclosed by others prior to the date of his alleged invention.

2. That the Harmatta patent, as to all of its claims, is anticipated by the work of Adolph Rietzel, conducted in the factory of plaintiff's predecessor, long prior to the date of Harmatta's alleged invention.

3. That the plaintiff is estopped to deny Rietzel's priority over Harmatta.

4. That the Harmatta patent, as to all of its claims, is anticipated by the prior work of F. P. McBerty, at Warren, Ohio, in the year 1901.

5. That the Harmatta patent is invalidated by the proven prior invention of Sebastian Ziani de Ferranti, in May, 1903.

6. That the Harmatta patent is invalid as to all of its claims, because Harmatta never made the statutory oath to any of such claims.

7. That the Harmatta patent is invalid because the delay in its grant was first employed to enable the

plaintiff to retain the dominance of the Rietzel patent, for the same invention, and, then, to secure a belated second patent, which had the effect of prolonging plaintiff's protection to twenty years, instead of limiting it to the statutory period of seventeen years.

8. That the adjudication in the Barney-Berry suit is so discredited as to entitle it to little or no weight, favorable to the plaintiff, in the determination of this cause.

9. That the conduct of the plaintiff and its predecessor has generally been so devious and inequitable as to disentitle it to the favorable consideration of a court of equity.

10. That the decree of the court below was right and should be affirmed.

MELVILLE CHURCH,
Counsel for Defendant-Respondent.

November 3, 1923.

Mr. Frederick P. Fish, with whom *Mr. J. L. Stackpole* and *Mr. H. F. Lyman* were on the brief, for petitioner.

Mr. Melville Church for respondent.

MR. JUSTICE SANFORD delivered the opinion of the Court.

This is a suit in equity brought by the Thomson Spot Welder Company in a Federal District Court in Michigan for the infringement of United States patent No. 1,046,066 for improvements in electric welding, issued December 3, 1912, to the plaintiff's predecessor in title, as assignee, upon an application filed by Johann Harmatta, December 3, 1903. The chief defenses were anticipation, lack of invention, prior public use, and estoppel. The District Court sustained all of these defenses, and dismissed the bill. 268 Fed. 836. The Circuit Court of Appeals—one judge dissenting—held the patent invalid for lack of invention, and, without considering the other defenses, affirmed the decree of the District Court. 281 Fed. 680. On account of a conflict with a prior decision of the Circuit Court of Appeals for the First Circuit, in *Thomson Electric Welding Co.* v. *Barney & Berry,* 227 Fed. 428, in which the patent had been held to be valid, this writ of certiorari was granted. 260 U. S. 718.

In the present case both the District Court and the Circuit Court of Appeals have held that Harmatta's improvement involved merely the exercise of mechanical skill and not invention. The question whether an improvement requires mere mechanical skill or the exercise of the faculty of invention, is one of fact; and in an action at law for infringement is to be left to the determination of the jury. *Keyes* v. *Grant,* 118 U. S. 25, 36, 37; *Holmes* v. *Truman* (C. C. A.), 67 Fed. 542, 543; *Hall* v. *Wiles* (C. C.), 2 Blatchf. 194, 11 Fed. Cas. 280, 283; *Poppen-*

husen v. *Falke* (C. C.), 5 Blatchf. 46, 19 Fed. Cas. 1052, 1054; *Shuter* v. *Davis* (C. C.), 16 Fed. 564, 566; *Blessing* v. *Copper Works* (C. C.), 34 Fed. 753, 754. Ordinarily, therefore, the case would call for the application of the well settled rule that the concurrent findings of the lower courts on questions of fact will be accepted by this Court unless clear error is shown. *Wright-Blodgett Co.* v. *United States*, 236 U. S. 397, 402; *United States* v. *State Investment Co.*, 264 U. S. 206, and cases there cited. We think, however, that this rule should not be strictly applied in cases brought here because of a conflict of decision in the different circuit courts of appeal, and have therefore given consideration to the question as to which of the decisions upon this question of fact, in the light of the prior art, is based upon the sounder reasoning. At the outset it is to be noted that in the First Circuit there was not a concurrent finding on the question of patentability; the District Court having found, as did the two courts in the present case, that the patent was invalid for want of invention. 227 Fed. 428, 433.[1]

Welding is the art, practised immemorially, of uniting two pieces of metal in one piece by heating those portions which are to be welded to a temperature at which they become plastic and then pressing them strongly together so as to effect a union; as exemplified by a blacksmith when heating in a forge the two pieces to be welded and hammering them together.

The art of electric welding, which was invented in 1886, was well advanced when Harmatta filed his application, having been disclosed in various prior patents for uniting the abutting ends of metal bars, wires, etc., uniting the over-lapped edges of metal sheets, plates, etc., and other purposes.

[1] The opinion of the District Court is published with that of the Circuit Court of Appeals.

The patent in suit relates to that branch of electric welding known as spot welding, by which two sheets or plates are welded together face to face, in spots, as a substitute for riveting; this being accomplished by placing the two sheets between two pointed electrodes applied to their exterior surfaces, opposite to one another, which heat the sheets to the welding temperature and exert the required pressure in the line between the points of the electrodes, resulting in welding together the inside faces of the sheets in the spot on that line.

The reasons for which the petitioner claims that this improvement is patentable are thus summarized in its brief: "Harmatta produced a new result, namely a small round weld (a spot weld) uniting two plane sheets of metal at any place in their meeting faces. This was radically new . . . 2. To make this spot weld Harmatta manipulated the articles with which he dealt, namely the sheets, in a new way by indiscriminately superimposing one upon the other and he made his electrodes perform a function, which no electrodes, used in electric welding, had ever before performed. 3. In so doing he carried out a new technical process, that is, the electric current, which generates the welding heat, behaved and operated in an entirely new way, . . . and he applied the welding pressure to a condition, which seemed to make such application impossible."

The opinions of the two District Courts and of the Circuit Court of Appeals for the Sixth Circuit holding that the patent in suit was lacking in invention, are based, in each instance, on a detailed and analytical consideration of the prior art. We take the following extracts from the well considered opinion of the Circuit Court of Appeals:

"The art of electric resistance welding was old and far advanced in 1903, when the Harmatta patent was applied for. Prof. Elihu Thomson . . . was a pioneer in

that art. In 1886 he obtained process and apparatus patents . . . for so-called butt welding, which involved the uniting of the abutting ends of metal wires, bars, etc., by applying heat at the joint and the adjacent surfaces by means of electrodes, and pressing the two pieces together when heated to welding temperature. There was here true resistance welding, with pressure of the parts involved, although the electrode did not exert the welding pressure. In 1889 Thomson obtained a patent . . . for electric riveting, which involved the heating of the rivet when in place by means of a current passed through it by the use of electrodes, under pressure thereon, the effect being not only to swage the rivet and weld it to the adjoining metal, but apparently (when desired) to weld together, in part at least, the portions of the plates immediately adjoining the rivet. In 1891 Thomson obtained a patent . . . for what is called lap-welding. While the specification states that the invention is specially adapted to the welding of the overlapped edges of plates, it . . . expressly includes 'welding together strips, sheets, plates, or bars of metal where it is desirable to form a joint of considerable length.' According to the specification, 'the surfaces to be welded are pressed together to form a union,' the work being fed in the longitudinal direction of the joint 'through suitable pressure devices (preferably roller electrodes), the work being properly arranged, so that the pressure devices will press the surfaces to be welded together and simultaneously passing the electric current through the work *at the point of pressure.*' The electrodes were employed to exert the welding pressure. The specification further states that 'as the work is passed through such rolls with a continuous motion *each point,* as it comes between the rolls, is heated and the surfaces pressed together.' . . . In 1893 Thomson obtained a patent . . . relating particularly to soldering sheet metal pieces flatwise, either

by the use of solder or (when applied to tin plates) by melting the tin sufficiently to establish union thereby. The electrodes, in the form of clamps or otherwise, served not only to supply the necessary heat, but to exert sufficient pressure upon the overlapped sheets to effect their union. A roller electrode is disclosed, performing the double function of heating and pressing, and having its periphery corrugated or grooved . . . This was, to say the least, electric resistance spot soldering. In 1897 Robinson received a patent . . . on so-called projection welding, as specially applied to the welding of a splice bar to the web of a railroad rail, the splice bar having upon its inner face a number of projections which by the application of the heating current are fused, and by pressure made to form welds between the projections on the bar and the fused opposing portions of the rail. Kleinschmidt, in 1898, took out a patent . . . for a similar process, and by methods not essentially unlike those of Robinson.

"Whether or not the Thomson so-called lap-welding invention should be regarded as an absolute anticipation of the Harmatta patent, we think the state of the art to which we have referred left no room for invention in Harmatta. . . . We see no distinction upon principle between plane-face welding and lap-welding; the former certainly embraces the latter. If Thomson's roller electrode device was capable of welding a line or seam in a metal lap joint, it was readily adaptable to line-welding together coterminous plane-face plates. . . . We think Thomson's lap-welding invention was in essence a welding in points. In fact, his line seam was merely a succession of adjoining points. . . . It satisfactorily appears that, although Thomson's roller electrodes in the form shown in the patent were not practicably adapted to commercial spot-welding as disclosed by the Harmatta patent, they could readily be made to do such spot-

welding by the use of suitable projections upon the face of the rolls (Thomson later did spot-soldering by the use of such projections); and assuming that pin electrodes were essential to successful commercial spot-welding, that form of electrodes was old, as illustrated by Thomson's electric soldering patent. . . . In our opinion the art of soldering is analogous to that of welding. . . . By the use of enough more heat Thomson's soldering device could readily have effected spot-welding. . . . No essential difference in principle between heating at points and heating in spots is apparent. Projection welding partakes, though not in so pronounced a sense, of the nature of spot-welding. . . . We agree with Judge Dodge [227 Fed. 428] that Harmatta's idea of 'making his electric welds small in area rather than large in comparison with the areas of the opposed surface to be joined and isolating them, so as to leave each surrounded by a comparatively large area of unwelded surface,' does not involve invention in view of the prior art. In other words, given the desire for a welding in spots, naturally enough suggested by the prior art and by its commercial development, we think Harmatta's specific application of the principles of that prior art involved only the skill of the expert mechanic. Not only every principle, but every electric and mechanical process, involved in the Harmatta claims, was well known in the prior or directly analogous arts, or in mechanical arts generally. We cannot think, in view of the prior art, that invention is to be found in the considerations, separately or collectively, that in Harmatta no bodily movement of the sheets is required, that the current is localized and pressure exerted solely by the electrodes, or by the difference in the form of the electrodes, or by the difference in amount of extruded metal, as compared with some of the earlier applications of resistance welding. Although invention is not necessarily negatived by the fact that each element of the

combination is old, the question of fact whether the combination itself involves invention in view of the prior art is always present.

"Our conclusion of noninvention, based upon a review of the prior art, is materially strengthened by the serious doubt whether Harmatta thought, when he filed his patent application, that he had patentably invented anything by the disclosure of spot-welding, as a process or product distinct from point-welding or line-welding, as well as by the fact that others previous to the grant to Harmatta, and apparently in ignorance of Harmatta's claimed invention, successfully practiced the art of spot-welding. . . .

"The patent issued nine years after the application was filed, and after numerous vicissitudes and amendments (including the entire elimination of the roller-electrode feature), and after the application had been placed in interference with the claims of Adolph Rietzel, to whom a patent had previously been issued on July 20, 1909. . . . From the beginning Rietzel's application was owned by plaintiff's predecessor. The interference was declared in favor of Harmatta, for Rietzel's failure, as the junior party to the interference, to take testimony in support of his claim of priority; plaintiff's predecessor at the time owning both the Harmatta application and the Rietzel patent.[2] . . . But the fact that the award of priority was not based upon an adjudication on the merits tends to weaken its force. It, however, convincingly appears . . . that in 1898 (and about five years before Harmatta's application) Rietzel, while in the employ of plaintiff's predecessor, in several instances successfully joined two pieces of lapped metal at isolated spots by means of a Thomson butt-welding machine; the

[2] The proceedings in the Patent Office are set forth at length in the opinion of the District Court (pp. 855 *et seq.*).

sheets of metal being united by pressing them together and at the same time passing the heating current from one electrode (or so-called contact) to the opposite electrode, at the selected spot on the meeting surface of the plates, the spots being restricted in area, so as to leave well-defined and comparatively extensive areas of no-union completely surrounding the spots—one of the electrodes or contacts used being of standard size and form, the other being reduced by cutting down to a diameter of about three-eighths of an inch. . . . Rietzel's experience strongly discredits inventive quality in what Harmatta did several years later, including his disclosure of the use of pin-electrodes. The fact also appears . . . that at various times, ranging from two years to five or six years, before the issue of the Harmatta patent, and apparently in ignorance of his asserted invention, various manufacturers put out or used spot-welding machines with commercial success. . . . These experiences also tend to discredit invention in Harmatta. It follows, in our opinion, from what has been said, that the effect of the great commercial success of the Harmatta invention in the hands of plaintiff is entitled to little weight upon the question of the invention, even were that question otherwise in doubt, which we think it is not." (pp. 682 *et seq.*).

The opinion of the Circuit Court of Appeals for the First Circuit, on the other hand, contains only general allusions to the prior art and no analysis of the prior patents. While, in considering the defense of anticipation, it is said that the soldering art was remote, the only statement in the opinion bearing directly upon the defense of want of invention, is that "in view of the further proposition that the presumptions in favor of the patent are so far supported in this case by the insistency of the defense, and the comparatively enormous expense involved in maintaining it, we cannot question the present

validity of the patent with reference to all propositions involved in the word 'patentability'". (p. 436.)

The conclusion of fact reached by the Circuit Court of Appeals for the Sixth Circuit, as set forth in its opinion, that in the light of the prior art Harmatta's improvement was lacking in invention, commends itself to our judgment. It involves no error in law. Therefore, without considering the other defenses presented, the decree of that court is

Affirmed.

THOMSON SPOT WELDER COMPANY *v.* FORD MOTOR COMPANY.

CERTIORARI TO THE CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT.

No. 120. Argued December 5, 1923.—Decided June 2, 1924.

1. The question whether an improvement in the arts involved invention or only mechanical skill, is a question of fact. P. 446.
2. The rule in this Court to follow concurrent findings of fact made by the District Court and the Circuit Court of Appeals unless clear error is shown, should not be strictly applied in a case brought here by certiorari to settle a conflict between decisions of two circuit courts of appeals concerning the validity of a patent for an invention. *Id.*
3. Patent No. 1,046,066 issued December 3, 1912, to Thomson Electric Welding Company, assignee of Harmatta, for improvements in electric welding, viz., for the process known as "spot welding", whereby sheets or plates of metal are welded together in spots, in lieu of riveting,—is void for want of patentable invention. P. 448.

281 Fed. 680, affirmed.

CERTIORARI to a decree of the Circuit Court of Appeals affirming a decree of the District Court which held void a patent and dismissed a bill for infringement.